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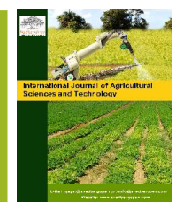
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Short Communication

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Biotechnology: The underappreciated tool for livestock development in Nigeria

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Abstract

The current state of the Nigerian agricultural system is at a significant level at which an intervention needs to occur. This is more particular due to the role that agriculture plays as a sector in her economy. Whilst the country is endowed with livestock and agricultural friendliness, it is important that its efficiency is sought in order to provide for the best and mass agricultural and livestock produce, both for consumption and business. As a means of achieving this, biotechnology comes into play. Livestock requires a lot of workings in which can mostly be efficient with the use of biotechnology; although it is almost alien in that part of the world. This paper seeks to address biotechnology as a great instrument for the development of livestock in Nigeria.

Keywords: *Biotechnology, Livestock production, Nigeria*

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1. Introduction

The immense and proliferating rate of the demand for animal and agricultural production in the world has overtime radically accepted the trend of technology. This is in order to meet the high demand of people, especially in livestock production. In developed countries, livestock accounts for more than half of agricultural production, while in developing countries the share is about one-third. The desired satisfaction to meet the high demand from the public has triggered technology to invent and come about an applicable tool to be used in this instance; biotechnology. Biotechnology is increasingly becoming a sustainable means of improving livestock production by directly influencing animal health, nutrition, reproduction, breeding and genetics. The effect of biotechnology is greatly manifested in the produce of agricultural product and livestock, i.e., increase in the quantity and quality of agricultural and livestock produce. Perhaps, this depicts the vast importance of the application of biotechnology in livestock production and development at large to suit and meet the public demand.

1.1. What is biotechnology in animal/livestock development?

It goes without saying that, in various countries around the globe, there has been a constant increase in the demand of livestock and livestock related products. The invention of biotechnology, in the wisdom of scientists, has been in an on-going successful quest of mitigating this significant demand, as well as seeking to increase the quality of these livestock products. At this juncture, it is imperative to explicitly define the term 'biotechnology' and its relation to animal or livestock production and development.

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Biotechnology is simply the application of in-genuine biological principles in manipulating living organisms or their derivatives to either improve or multiply a product. It is also defined as a technique that uses living organisms to make or modify and improve products. In essence and in relation to the literal terms that make up 'biotechnology'; bio and technology, biotechnology is the utilization of the study of a collection of techniques to influence living organisms to produce a desired result. Biotechnology in its influence in livestock development revolves around, if not all, most aspect of livestock animals. Biotechnology also includes its applications in various fields ranging from agricultural practice to the medical sector. It does not only include applications in fields that involve the living, but any other field where the information obtained from the biological aspect of an organism can be applied.

Earlier posited that biotechnology revolves around various sectors of livestock animals, primary areas would be subsequently discussed as follows:

(i) Biotechnology in animal health: Animal health is potentially the most important aspect of animal production and any development in this area of biotechnology will greatly benefit the industry, consumption of livestock products and the society as a whole. The larger part of the success of livestock production is majorly dependent on the health of such animals. The poor state of health of these animals would truncate the success of then production and development of livestock production. Biotechnology in this simply plays the role of providing healthcare and preventing diseases in animals through various controls. Disease prevention, being the most active faculty in animal health technologies, has resulted in the development of vaccines. Although other methods of disease prevention and control such as vector control and quarantine are widely applied, vaccination still remains comparatively a sustainable means of providing health since the cost implication of vector control and quarantine is a limiting factor. In most cases, disease management requires the application of a combination of control measures. Asides this, biotechnology has been able to provide for disease diagnosis in animals which is targeted at enhancing speedy identification of disease at early stages to facilitate treatment.

(ii) Biotechnology in animal nutrition: Animal nutrition is very key in any animal or livestock production system. Feed, in this regard, is the largest single cost item for livestock and poultry production, accounting for about 60% of the total cost in most years. Animal nutrition has for a long time posed as one of the greatest challenges to animal production with limitations arising from both quality and quantity. A large proportion of animal feeds are fibrous with varying levels of digestibility and nutritive values. Biotechnology has been able to improve the nutritive value for feeds, enhance digestibility, acceptability and removal of anti-nutritive factors from feeds, especially for ruminant animals. Biotechnology in animal nutrition majorly makes use of recombinant deoxyribonucleic acid (DNA) technology and fermentation technologies. These techniques are often based on the use of micro-organisms for the production of nutrients such as particular essential amino acids or complete proteins or to improve the digestibility of animal feeds. These technologies are being used to increase the quality of silage, to produce probiotics, to produce specific enzymes and hormones, and to degrade fiber content in feed and fodder.

(iii) Biotechnology in Animal Reproduction: Biotechnology has great impact on breed improvement, reproductive rate, and animal production ([Atsbha Hadgu, and Haben Fesseha, 2020](#)). The most common reproductive applications that are integrated with biotechnology are Artificial Insemination (AI), semen preservation, fertilization capacity of sperms, sperm sexing, synchronization and fixed-time insemination, super ovulation, embryo transfer (ET), and in vitro embryo production (IVEP). AI is by far the most widely used form of biotechnology in animal reproduction and, according to various researches, has been reported to result in genetic progress that is four times better than natural mating. This is however realistic considering the high selection intensity and accuracy arising from AI since only the top quality animals are selected for use in producing numerous offspring. In most cases, the technology is restricted to cattle especially dairy cattle since beef cattle are managed extensively. This most times produces breeds of cattle that are both good for dairy and beef production.

2. Importance of biotechnology in livestock development

The multifaceted nature of livestock production and development requires that animals be nursed, fed and bled in a sustainable manner to enable consistency in food production. Biotechnology has been able to significantly achieve this to some extent, hence, the vast importance of biotechnology in different areas of livestock development through the following reasons ([Getachew, 2016; Kahi, and Rewe, 2008](#)):

Its contribution in ensuring the healthy state of animals while keeping them.

1. Its contribution in the increase of the quantity and quality of livestock production.

2. The creation of vaccines that can cure animals without having the risk of losing such animal.
3. The quick diagnosis of diseases in animals to affect the next step of treatment.
4. In the utilization of therapeutic proteins in animal's milk, eggs, and blood to contribute to the development of biopharmaceuticals.
5. The help in producing environmentally friendly animals, as well as conserve endangered species.
6. Genetic studies of endangered animals which results in the increased genetic diversity which can result in healthier populations of species.

3. The practice and reality of biotechnology as a tool in livestock development in Nigeria: The underappreciated

Without mincing words, the full extent of the practice of biotechnology in agricultural production in Africa had been at its minimal state. The adoption of biotechnology in livestock development has been even more almost unnoticeable. Consequently, Nigeria, being a prominent country in Africa, has been an inevitable partaker of this unfortunate development in the non-participation and utilization of biotechnology in livestock production and development sector in the country. In Africa, livestock are still being reared in natural pastures and around the environment; grazing. The rearing of these animals has, since the genesis, remained traditional. Besides extracting beneficial from animals such as milk, cotton and so on, livestock mainly revolves around feeding, harboring and killing. The practice of livestock in Nigeria has been evidently left behind as a new practice of biotechnology has been adopted. The standard of the international livestock industry now adopt and practice AI, semen preservation, fertilization capacity of sperms, sperm sexing, synchronization and fixed-time insemination, super ovulation, ET, and IVEP. These practices are in a bid to ensure the good health of animals by providing vaccine, create hybrid animals that serve the purpose of the two best qualities in animals, animal cloning and so on.

The non-participation in biotechnology has had its toll and impact in the production and development of livestock in Nigeria. For instance, research has shown that certain meat, even after going through heat, still has a considerable amount of diseases in them which are unfortunately consumed by the public. Without doubt, the consumption of an infected animal also has its negative effect on the consumers. Furthermore, there are situations where, due to the traditional method of rearing animals, some disease can not be diagnosed of which has the tendencies of been contracted by individuals who do as little as going close to such animals, i.e., anthrax, brucellosis, salmonellosis, bovine tuberculosis and so on.

Nigeria has sadly not been able to meet up to international standards in the international market; this is due to no other reason than her minimal adoption of biotechnology. Nigerian is beyond doubts blessed with nutritious livestock products, however, Nigeria has failed to fully leverage in exploring this rare blessing. Nigeria presently focuses its exportation on crude oil consequently ignoring the need for diversification of exports. Perhaps, the non-involvement of biotechnology in the development of livestock products has barred Nigeria from meeting acceptable international standards that qualifies her to export livestock products as a mean of generating revenue for the country.

Based on the aforementioned, it is glaring that biotechnology has been substantially ignored as a tool in the development of livestock production and development in Nigeria. Although this could be blamed on reasons such as ignorance of the importance of biotechnology, limited funds to engage in the expensive practice of biotechnology, the complex procedures of biotechnology, limited individuals with the knowledge of biotechnology and so on, there has been established the need for Nigeria and Africa at large to embrace and practice this beneficial advent of technology in the development of livestock.

4. Recommendations

1. Biotechnology development in livestock requires the involvement of the people vested with the authority to lead in order to ensure a smooth development devoid of financial or legal constraints
2. The government should vest upon or create an organization that would be responsible for a majority of the processes required to successfully develop and transfer relevant biotechnologies across all countries, as well as research.
3. There should be a sensitization of the public, especially concerned parties, on the importance of biotechnology in livestock production

5. Conclusion

There has been a successful establishment of the fact that Nigeria has undermined and not actively engaged in biotechnology due to diverse reasons. Albeit, the potential for Africa in the international livestock industry is promising as demonstrated by the encouraging developments in stable countries in the south, e.g., (Republic of South Africa), east, e.g., (Kenya) and west, e.g., (Ghana), there is a need for Nigeria due to its natural blessings in livestock to fully or actively adopt biotechnology to aid its livestock development as well as other area or field of agriculture.

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