

Application of Biotechnology towards Diagnosis and Treatment in Veterinary Medicine in Africa: Potentials and Future Developments

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Biotechnology is an already established technique in several areas of medicine, but its application in the field of veterinary medicine has only started to emerge with the potential to revolutionize veterinary practice. This paper therefore reviews the potential applications of biotechnology in veterinary medicine towards diagnosis and treatment in Africa which includes; molecular **gene cloning**, production of recombinant biotechnology derived vaccines, application of polymerase chain reaction (PCR), Real time polymerase chain reaction (RT-PCR), Polymerase chain reaction - restriction fragment length polymorphism (PCR-RFLP) and **Bioinformatics** to diagnosis of infectious and parasitic diseases, gene therapy, disease diagnosis, treatment delivery systems and many more. These components occur in other parts of the world and are therefore presumed to be consolidated into the African delivery framework as a private enterprise in a foreseeable future. Whilst it is sensible to postulate that biotechnology application and its peculiar evolution will imminently transform veterinary medicine, there is immense treat, amidst stakeholders in the industry, about food health and safety and other civil and ethical concerns which can hinder this novel scientific breakthrough. The ethical concerns which include; theory of the Three Rs (Reduction of animal population, Refinement of enactments and farm managements to curtail affliction and despair, Replacement of animals with non-animal surrogate wherever necessary. Limitations regarding the application to veterinary practices are extensively discussed. This review has implication on the future of revolutionisation of veterinary practice and increase in animal protein source for human consumption.

The term Biotechnology is broadly defined as the ability to use living organisms or substances to improve or reconstruct a product, to ameliorate animals or plants or to evolve microorganisms for peculiar purposes. Conventional animal breeding involving the collection and breeding of phenotypically desired individuals is an ideal illustration of a well-established application of biotechnology. However, the latest biotechnology comes from the recent breakthroughs such as recombinant Deoxyribonucleic Acid (DNA), the hereditary substances in all living organisms from bacteria to an elephant, restricts and regulates all the functions of living organisms. DNA technology and its corresponding techniques, monoclonal antibody techniques, embryo manipulation technology, Polymerase chain reaction (PCR) have underlined feasibilities

for manipulating biological systems for the well-being of humanity through genetic manipulations using microorganisms and vector hosts. Although, human medicine has apparently profited the bulk from biotechnology, successful application of veterinary biotechnology has predominantly been restricted to developed nations. Explicitly, there are rarely any success stories of the application of biotechnology in the advancement of animal health and husbandry in the developing nations. The aim of this paper therefore is to review accessible biotechnologies with prospective application in disease diagnosis and treatment and to ascertain those which have been or may be administered in Africa in particular and other developing nations including Asian continent. Taking into consideration the scope of the subject matter, not much magnitude is given to the description of each section. Comparatively, an effort is made to accentuate the technologies adjudged to have current or potential application in the field of veterinary medical practice. This review paper concludes with a cursory reportage of the impediments concerning the prospective environmental threats of genetic engineering and other biotechnologies, necessitating their ethical appraisal for a global regulatory mechanism.

Limitations

To control animal diseases in many parts of Africa however, the problem is not how to develop new, more effective diagnostic methods, drugs or vaccines. Rather, it is their accessibility to the local societies. For this, more effective organisational structures of veterinary services are more important than further refinement of diagnostic methods or better vaccines. More effective services also include community-based animal health workers, who live in the livestock-keeping communities and provide the local animals with inexpensive "first aid" for the effective management of diseases.

Conclusion and Future Perspectives

In conclusion, we are persuaded that biotechnology will suffice as a revolution in every discipline of life sciences including veterinary medicine in many parts of Africa. Egypt has hitherto demonstrated the precedence in the African continent in the application of Biotechnology in Veterinary Medicine. However, revolution alone devoid of practical enactment never had an impression on our community. It is therefore of greatest significance that the breakthrough accomplished in basic and

clinical science becomes elucidated in to public endeavour and in practical applications. Finally, it is hoped that biotechnology will in the nearest future vigorously accord to the advancement in the field of diagnosis in veterinary medicine in the entire

continent of Africa. This will therefore provide tools and biomarkers that will allow an exceptional understanding of the mechanisms in the propagation of livestock epidemics.