

Veterinary Vaccines Concepts & Application

Vaccination is one of the most important and cost effective methods available for preventing infectious diseases of man and animals. No real alternative exists for viral diseases of animals since there are no antiviral drugs suitable for wide spread application. No other method in human or veterinary medicine has had such impact in reducing morbidity and mortality and increasing the overall well being of humans and animals. But the animals and humans continued to suffer from infectious diseases in spite of this success. Indeed, WHO reports that 8 out of 10 major causes of death in humans are due to infections agents. Vaccinology is one of the most important subject not only in Veterinary Sciences and Animal Husbandry but also in Medical sciences. This book 'Veterinary Vaccines : Concepts and Applications' is written based on the most relevant and latest informations on conventional vaccines of important viral and bacterial diseases of animals so that everybody can read and understand it quickly, easily and properly. This book is useful for scientists, teachers, students, officers, diagnosticians, laboratory technicians and medical personnel associated directly or indirectly with research, teaching, training, extension, diagnosis, epidemiology and control of diseases of bacterial and viral origin. All the important animal diseases of viral and bacterial origin have been dealt with incorporating latest, useful and elaborate informations so that end users will be benefited to a large extent in their day to day life. Further, informations have also been provided on latest developments in vaccinology arena viz., DNA vaccine, recombinant vaccine, marker vaccine, synthetic peptide vaccine and plant based vaccine. This book is highly informative to the Life Sciences students and other enthusiastic readers appearing in the various competitive examinations such as JRF, SRF, IAS, CSIR, NET, AAS, ICAR, IFS, IPS, Lectureship etc. Further, it will be extremely useful to all the persons who are directly or indirectly involved in the prevention and control of diseases of animal origin using the immunoprophylactic measures and their welfare. Finally, all can enrich their knowledge on any aspects of vaccinology from the book and can clarify any doubts and concepts very easily and confidently.

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**Veterinary Vaccines :
Concepts and Applications**

Veterinary Vaccines Concepts and Application

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Preface

There is a proverb 'prevention is better than cure'. This idea leads to the development of vaccines, which have transformed animal and human health since the time of Jenner in the late 18th Century. Vaccination is one of the most important and cost effective approaches available for preventing infectious diseases of man and animals. No real alternative exists particularly for viral diseases of humans and animals since there are only few anti-viral drugs available which are expensive and not suitable for wide spread application. Vaccines play an important role in the control of infectious diseases and in preventive health care programme for animals and humans. Smallpox has been eradicated, polio on the verge of eradication, tetanus and anthrax have been controlled and measles and rubella have been targeted for elimination. With wide spread use of vaccines, bacterial meningitis is becoming rare in countries that vaccinate their children. Effective vaccines for hepatitis A and B are now available in the market. Rota virus infection, the main cause of infantile diarrhea and dehydration in children is now disseminated with the use of vaccines. Reduction of pneumonia is now possible both in infants and in the elderly. Several forms of cancer caused by viruses can now be prevented. Vaccines have been developed against most of the infectious viral, bacterial and parasitic diseases. All of this and more has been accomplished through the deployment of vaccines, particularly in the last 50 years. Governments have reasons to promote vaccination: aside from humanitarian concerns, better health of a population lowers medical costs and is associated with broad economic benefits. Therefore, the vaccine industry has been growing in importance and new companies are springing up in developing countries, often in association with western manufacturers. Many governments consider vaccine production to be a precious resource to control epidemics of new types of influenza and other emerging infections. Industrialized as well as poor countries' people have had access to preventive measures that make life better and safer. However, vaccines have not yet been developed against many diseases viz., Dengue, CCHF, SARS, Marburg and Ebola virus infections, Hanta virus, hepatitis C and G of humans and Nipah virus infections in pigs, Hendra of horse etc. There is an urgent need to develop vaccine against these diseases. With

the advent of recent discovery in the field of biotechnology, immunology, bioinformatics, virology, proteomics, genomics, metagenomics and DNA microarrays, it is now possible to develop vaccines with maximum benefits and minimum side effects. This book provides a general concept about the developments, manufacturing, use of vaccines and its effects on host in a simple, lucid and easily understandable manner so that the students, scientists, teachers, academicians, policy makers can face any challenges with a certain degree of confidence and implement any vaccination programme judiciously with promising and encouraging results. Lastly it is stated that 'Health is wealth' and to protect health vaccines should be administered timely to humans and animals in an appropriate manner taking into consideration all the factors influencing the vaccination so that 'Health for all' can be achieved in foreseeable future. At the end, it is stated that if eternal vigilance is the price of liberty, then constant protection by vaccination is the price of good wealth.

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Chapter 1

Historical Background and General Concept

Diseases are as old as man. Some like rabies and AIDS are dreadful, other like cancer are protracted and painful and many are a nuisance. Man and microbes have survived, adapted, evolved and co-existed together ever since their origin on this planet. Health may be considered as a condition of an integrated functional harmony of the physiological systems interacting and adapting to factors of the environment. Health for all particularly for India is a laudable goal which is possible to achieve. The efforts required are to be carefully planned, resources provided, implemented and reviewed.

Vaccination is one of the most important and cost effective methods available for preventing infectious disease of man and animals. No real alternative exists for viral diseases of animals since there are no antiviral drugs suitable for wide spread application. No other method in human or veterinary medicine has had such impact in reducing morbidity and mortality and increasing the overall well being of humans and animals. But the animals and humans continued to suffer from infectious diseases in spite of this success. Indeed, WHO reports that 8 out of 10 major causes of death in humans are due to infectious agents. In its original concept, vaccination aims to mimic the development of naturally acquired immunity by inoculation of non-pathogenic but still immunogenic components of the pathogens or closely related organism.

Vaccines play an important role in the control of infectious diseases and in preventive health care programme for animals and humans. Veterinary vaccines have been considered as core products of animal health and have contributed to the eradication or control of many of