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Trends in Veterinary Diagnostics

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Animal diseases are a major and increasingly important factor reducing livestock productivity especially in developing countries like India. Tests for the specific diagnosis are of two general types *viz.,* tests that demonstrate the presence of the infectious agent, major antigens expressed by the agent or its nucleic acid and tests that demonstrate the presence of the antibodies against the infectious agent.

While many traditional methods are still widely used, most are too slow to have any direct influence on clinical management of a particular case, providing results after several days. Conventional immunoassays like agar gel immuno diffusion (AGID) for Equine Infectious Anaemia (EIA) is a classical example in this regard.

A major thrust in the development in animal disease diagnostics has been toward rapid methods that can provide a definitive answer in less than 24 hours or even during the course of the initial examination of the animal. To achieve such rapidity, the methods should fulfil the prerequisites of speed, simplicity, sensitivity, specificity, reproducibility and low cost. Some conventional immunoassays like indirect immunoperoxidase test for the detection of antigens of duck swollen head haemorrhagic disease virus or dot immunoperoxidase test for identification of Blue tongue virus can fulfil the prerequisites of sensitivity and specificity along with the improved immunoassays like ELISA that is used for Foot and Mouth Diseases (FMD) virus typing and strain differentiation or fluorescent polarization assay for diagnosis of bovine brucellosis. Moreover the pen side diagnostic tests like immunochromatographic method based on lateral flow principle for diagnosis of rabies or the reverse-transcriptase loop mediated isothermal amplification (RT-LAMP) for detection of 5' NTR gene of classical swine fever virus aids to the rapidity.

For laboratory based diagnosis, the classical polymerase chain reaction (PCR) is being widely exploited to detect the nucleic acids in clinical specimen as a very rapid alternative to other detection methods, especially in the virulence typing of Avian Influenza A virus. The different versions of PCR like nested PCR (for whole genome sequencing of pestiviruses), Real-Time PCR (RT-PCR) (for differentiation of morbilli virus for insertion sequence analysis of *Mycobacterium paratuberculosis*) and multiplex PCR (for differentiating the cluster of different viruses causing diseases in swine) have improved the skill of veterinary diagnosticians from time to time.

Rapid advances in molecular biology provide new powerful diagnostic tools. Nano-based and refined diagnostic techniques are increasingly receiving greater attention because of the development in the field of agricultural biotechnology. Specific Influenza virus strain detection and use of gold nanoparticles are quiet noteworthy in this regard. Use of DNA biotechnology in animal health (for instance micro array based diagnosis for genus and type level differentiation of viruses belonging to the *family* Picornaviridae) may contribute significantly to improve the animal disease control programme and thus can stimulate both food production and livestock trade. The field of modern biotechnology provides the facilities for protein sequencing of the target and chance to manipulate DNA. The phylogenetic analysis by sequencing the 16srRNA gene or the advent of new generation sequencing technologies like massive parallel signature sequencing, pyrosequencing or Solexa have made microbial identification easier along with culture-independent studies (or metagenomics) for exploration of all microbial genomes. The field of modern biotechnology provides the facilities for protein sequencing of the target and chance to manipulate DNA and this particular concept is used nowadays to generate specific recombinant antibodies for the development of specific immunoassays, the classical example being Creditest FMD-NS ELISA for detection of non-structural protein (NSP).

Last but never the least, a veterinarian should be keen to know the recent advances in the veterinary diagnostics along with the past trends and the future opportunities for further improvement in the diagnostic facilities for better management of economically important diseases of livestock.

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