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Immunoreactivity of foot and mouth disease virus encapsulated in chitosan nanoparticles

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Foot and Mouth Disease (FMD) is a severe, highly contagious viral disease of cloven footed animals with significant economic impact. The organism which causes FMD is an *Aphthovirus* of the family Picornaviridae. There are three serotypes (A, O and Asia1) prevalent in India. More than 80% of the outbreaks are caused by serotype 'O'. Currently, the disease is being prevented by vaccinating the animals with inactivated and mineral oil adjuvanted vaccine which are incapable of giving sterile immunity though significant titers of neutralizing antibodies in the serum are produced. The present study was undertaken to evaluate the efficiency of chitosan nanoparticles to induce mucosal as well as systemic immune responses. The inactivated foot and mouth disease virus vaccine strain 'O IND R2/75' was encapsulated in biodegradable chitosan nanoparticles by ionic gelation method. Chitosan nanoparticles containing the inactivated FMDV vaccine against FMD (FMDV-CS-NPs) were produced with good morphology, high stability, a mean diameter of 615.3 nm, an encapsulation rate of 64-69% and a zeta potential of +46.07 mV. The virus release assay results of FMDV-CS-NPs indicated that FMDV was released from FMDV-CS-NPs with an initial burst release of 21%. The nasal secretory IgA levels were significantly high in the nasal fluid of the calves immunized with FMDV-CS-NPs intranasally as compared to the other groups. Calves immunized intranasally or intamuscularly with FMDV-CS-NPs were partially protected as compared to the calves immunized with inactivated vaccine which showed 75% protection on challenge infection with 10,000 BID_{50} virulent virus after 45 days post primary immunization. The chitosan nanoparticles can be used for protecting and delivering the antigen to the targeted sites.

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Antibiotic resistance of non-typhoidal *Salmonella* strains isolated from broiler products in the North West province of South Africa

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This study was conducted to evaluate the resistance of non-typhoidal *Salmonella* strains (NTS), isolated from broiler products in the North West province of South Africa to antimicrobials. A total of 60 NTS isolates recovered from raw broiler products and confirmed by PCR were evaluated for antimicrobial resistance by disk diffusion method, using a panel of 10 antibiotics. The NTS isolates that were identified and used in this study include *S. typhimurium*, *S. enteritidis* and *S. newport*. The antimicrobials used were ampicillin (10 µg), chloramphenicol (30 µg), ciprofloxacin (5 µg), amikacin (30 µg), trimethoprim-sulphamethoxasole (25 µg), tetracycline (30 µg) cefotaxime (30 µg), meropenem (10 µg), gentamicin (10 µg) and erythromycin (15 µg). Isolates resistant to ampicillin (n=48), tetracycline (n=60) and chloramphenicol (n=12) were further screened by PCR for antibiotic resistance genes, targeting the *blaTEM*, *tet* and *cat* genes. All the strains tested were resistant to two or more antibiotics. All isolates were susceptible to cefotaxime, meropenem, gentamycin and amikacin whereas all were resistant to tetracycline. Resistance to trimethoprim-sulphamethoxasole, ciprofloxacin and chloramphenicol was low, being 8.3%, 13.3% and 20% respectively. Multi-drug resistance was discovered in 9 *S. typhimurium* strains, representing 15% of the tested isolates. In addition, the *blaTEM* gene was identified in 15 (31.3%) of the isolates screened, whereas the *tet* and *cat* genes were expressed in 12 (20%) and 6 (50%) resistant isolates respectively. The observations of this study indicate that NTS strains isolated from broiler products are resistant to multiple antibiotics, including quinolones.

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