## Claims

1. A genetically attenuated *Bordetella pertussis* strain that expresses a hybrid protein comprising a part of the filamentous haemagglutinin (FHA) protein in the form of a N-terminal fragment of FHA enabling surface expression and secretion of a heterologous epitope or antigenic protein or protein fragment linked to said N-terminal fragment of FHA, said heterologous epitope or antigenic protein or protein fragment being different from FHA, wherein the gene encoding for the native FHA protein is inactivated and the nucleic acid coding for the hybrid protein is in the locus of the deleted dnt gene.

2. The *Bordetella pertussis* strain of claim 1, wherein the gene coding for the native FHA protein is partially or fully deleted.

3. The *Bordetella pertussis* strain of claim 1 or 2, wherein the N-terminal fragment of the FHA protein comprises the amino acids from positions 1 to 330, starting with the first amino acid of the FhaB preprotein.

4. The *Bordetella pertussis* strain of anyone of claims 1 to 3, wherein the heterologous protein of said hybrid protein comprises at least one epitope of a protein that is expressed by pathogens responsible for infections of the upper or lower respiratory tract.

5. The *Bordetella pertussis* strain of claim 4, wherein the pathogen is an Influenza virus.

6. The *Bordetella pertussis* strain of claim 4, wherein the pathogen is a Respiratory Syncytial Virus (RSV).

7. The *Bordetella pertussis* strain of claim 4, wherein the pathogen is Streptococcus pneumonia.

8. The *Bordetella pertussis* strain of anyone of claims 1 to 3, wherein the hybrid protein comprises the N-terminal fragment of the FHA fused to the extracellular domain of the matrix protein (Me2) of the influenza A virus.

9. The *Bordetella pertussis* strain of anyone of claims 1 to 3, wherein the hybrid protein comprises the N-terminal fragment of the FHA protein fused to at least an antigenic fragment of the G protein of the Respiratory Syncytial Virus (RSV).

10. The *Bordetella pertussis* strain of anyone of claims 1 to 3, wherein the hybrid protein comprises the N-terminal fragment of the FHA protein fused to an antigenic fragment of the PcsB protein of *S. pneumoniae*.

11. An immunogenic composition comprising the *Bordetella pertussis* strain of anyone of claims 1 to 10, for use in the treatment or prevention of a mucosal or systemic infectious disease.

12. A live attenuated vaccine comprising the *Bordetella pertussis* strain of anyone of claims 1 to 10, for use in the treatment of a mucosal or systemic infectious disease.