is most effective when the challenge is with a PRRS virus genetically homologous to the MLV. The MLV vaccines have been less effective against challenge with heterologous viruses. Further, MLV have shown some reversion to virulence, such that the vaccine virus causes disease in vaccinated animals. Vaccines containing inactivated (i.e. killed) PRRS viruses have better safety profiles, but efficacy against heterologous challenge has been limited.

Because current PRRS vaccines do not show sufficient safety and efficacy to reduce the economic impact of PRRS virus infection, new and improved vaccines are needed. Preferably, those vaccines would be both safe and efficacious. If the vaccines comprise attenuated MLV, those attenuated MLV should not demonstrate reversion to virulence in order to be considered safe to use in the field. For example, by adapting a PRRS strain to growth in tissue culture cells for at least 80 passages, or preferably at least 100 passages, the MLV should not demonstrate reversion to virulence. To be efficacious, a vaccine virus strain should be able to elicit protective immunity in a porcine animal against a range of phylogenetically diverse wild type PRRS strains. Preferably, a new PRRS vaccine virus strain would be able to elicit protective immunity in a porcine animal against at least three phylogenetically diverse wild type PRRS strains.

SUMMARY

In one aspect of the present disclosure, there is provided a modified, live Porcine Reproductive and Respiratory Syndrome (PRRS) virus strain, wherein the consensus complementary DNA sequence of said PRRS strain is at least 95% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13.

In another aspect of the present disclosure, there is provided an immunogenic composition comprising a modified, live PRRS virus strain having a consensus complementary DNA sequence at least 95% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13; and
a pharmaceutically-acceptable excipient, stabilizer, solubilizer, or diluent.

In yet another aspect of the present disclosure, there is provided an immunogenic composition comprising a modified, live PRRS virus strain having a consensus complementary DNA sequence at least 98% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13; and

a pharmaceutically-acceptable excipient, stabilizer, solubilizer, or diluent for use in treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

In a further aspect of the present disclosure, there is provided a use of an immunogenic composition comprising a modified, live PRRS virus strain having a consensus complementary DNA sequence at least 98% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13; and a pharmaceutically-acceptable excipient, stabilizer, solubilizer, or diluent in the manufacture of a medicament for treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

In another aspect of the present disclosure, there is provided a vaccine comprising a modified, live PRRS virus strain, wherein said PRRS virus strain is SD 11-21.

In yet another aspect of the present disclosure, there is provided a vaccine comprising a modified, live PRRS virus strain, wherein said PRRS virus strain is SD 11-21, for use in treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

In a further aspect of the present disclosure, there is provided a use of a vaccine comprising a modified, live PRRS virus strain, wherein said PRRS virus strain is SD 11-21, in the manufacture of a medicament for treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

DESCRIPTION

The present invention provides for a modified, live Porcine Reproductive and Respiratory Syndrome (PRRS) vaccine virus strain, wherein the consensus complementary DNA sequence of said PRRS strain is at least 90% identical to a sequence selected from the group of SEQ ID NO: 4, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, SEQ ID NO: 12, and SEQ ID NO: 13. Preferably, the modified, live strain could have a consensus complementary DNA sequence that is at least 95% identical to a sequence selected from the group of SEQ ID NO: 4, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, SEQ ID NO: 12, and SEQ ID NO: 13. More preferably, the modified, live strain could also have a consensus complementary DNA sequence that is at least 98% identical

to a sequence selected from the group of SEQ ID NO: 4, SEQ ID NO: 9, SEQ ID NO: 10, SEQ ID NO: 11, SEQ ID NO: 12, and SEQ ID NO: 13. As a person of ordinary skill will appreciate, due to the high mutation rate of the PRRS virus, a modified, live PRRS strain might comprise a multiplicity of subpopulations, each having a homologous but not identical genome.

WHAT IS CLAIMED IS:

1. A modified, live Porcine Reproductive and Respiratory Syndrome (PRRS) virus strain, wherein the consensus complementary DNA sequence of said PRRS strain is at least 95% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13.

2. The modified, live PRRS virus strain of Claim 1, wherein the consensus complementary DNA sequence of said PRRS strain is at least 98% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13.

3. The modified, live PRRS virus strain of Claim 1, wherein said PRRS strain is SD 11-21.

4. The PRRS strain of Claim 1, wherein said PRRS virus strain is passaged at least 80 times in tissue culture cells.

5. The PRRS strain of Claim 1, wherein said PRRS virus strain is passaged 100 times in tissue culture cells.

6. An immunogenic composition comprising a modified, live PRRS virus strain having a consensus complementary DNA sequence at least 95% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13; and
a pharmaceutically-acceptable excipient, stabilizer, solubilizer, or diluent.

7. The immunogenic composition of Claim 6, wherein the consensus complementary DNA sequence is at least 98% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13.

8. The immunogenic composition of Claim 6, wherein the modified, live PRRS virus strain is SD 11-21.

9. The immunogenic composition of Claim 6, further comprising an adjuvant.

10. An immunogenic composition comprising a modified, live PRRS virus strain having a consensus complementary DNA sequence at least 98% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13; and a pharmaceutically-acceptable excipient, stabilizer, solubilizer, or diluent for use in treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

11. Use of an immunogenic composition comprising a modified, live PRRS virus strain having a consensus complementary DNA sequence at least 98% identical to a sequence selected from the group of SEQ ID NO: 9, SEQ ID NO: 12, and SEQ ID NO: 13; and a pharmaceutically-acceptable excipient, stabilizer, solubilizer, or diluent in the manufacture of a medicament for treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

12. A vaccine comprising a modified, live PRRS virus strain, wherein said PRRS virus strain is SD 11-21.

13. A vaccine comprising a modified, live PRRS virus strain, wherein said PRRS virus strain is SD 11-21, for use in treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

14. Use of a vaccine comprising a modified, live PRRS virus strain, wherein said PRRS virus strain is SD 11-21, in the manufacture of a medicament for treating or preventing a symptom caused by type 2 Porcine Reproductive and Respiratory Syndrome (PRRS) virus infection in a porcine animal.

15. The vaccine or use of Claim 13 or Claim 14, wherein the PRRS virus infection is caused by a virulent type 2 PRRS virus heterologous to the modified, live PRRS virus strain in the vaccine.