CLAIMS

What we claim is:

1. A composition or vaccine comprising (i) a recombinant APMV viral vector and (ii) a pharmaceutically or veterinarily acceptable carrier.
2. The composition or vaccine of claim 1, wherein the APMV is APMV-8, APMV-2, APMV-4 or APMV-6.
3. The composition or vaccine of claim 1 or 2, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1.
4. The composition or vaccine of any one of claims 1-3, wherein the APMV viral vector further comprises an isolated polynucleotide encoding an antigen, and wherein the polynucleotide is inserted in a nonessential region of the APMV genome.
5. The composition or vaccine of claim 3, wherein the nonessential region is selected from the regions consisting of untranslated region located upstream of the NP open reading frame, intergenic regions between two open reading frames of the APMV genome, and untranslated region located downstream of the L open reading frame.
6. A method for producing recombinant APMV viral vector, wherein the method comprises the introduction into the APMV genome an isolated polynucleotide in a nonessential region of the APMV genome.
7. The method of claim 6, wherein the APMV is APMV-8, APMV-2, APMV-4 or APMV-6.
8. The method of claim 6 or 7, wherein the APMV comprises a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1.
9. The method of any one of claims 6-8, wherein the nonessential region is selected from the regions consisting of untranslated region located upstream of the NP open

reading frame, intergenic regions between two open reading frames of the APMV genome, and untranslated region located downstream of the L open reading frame.

10. The method of any one of claims 6-9, wherein the method comprises the steps of:
    a) preparing expression plasmids expressing NP, P and L genes;
    b) preparing a transcription plasmid comprising an isolated polynucleotide in a nonessential region of the full length APMV genome;
    c) transfection of the expression plasmids and transcription plasmid into a host cell;
    d) rescuing/recovering the infectious APMV virus from the host cell.
11. The method of any one of claims 6-9, wherein the method comprises the steps of:
    a) preparing expression plasmids expressing NP, P and L genes;
    b) preparing a transcription plasmid comprising an isolated polynucleotide in a nonessential region of the full length APMV genome;
    c) preparing an expression plasmid expressing T7 polymerase
    d) transfection of the expression plasmids and transcription plasmid into a host cell;
    e) rescuing/recovering the infectious APMV virus from the host cell.
12. A method for inducing an immunological response in an animal to an antigen comprising inoculating the animal with a composition or vaccine comprising a recombinant APMV viral vector, wherein the recombinant APMV viral vector comprises and expresses the antigen of a pathogen for said animal.
13. The method of claim 12, wherein the immunological response in an animal to the antigen is induced in a prime-boost regime.
14. The method of claim 12, wherein the animal is avian, equine, canine, feline, porcine, bovine, ovine, or human.
15. An unmodified or modified APMV virus comprising a polynucleotide selected from the group consisting of:

a) a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1;

b) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide

having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2;

c) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4;

d) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6;

e) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8;

f) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10; and

g) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide

having the sequence as set forth in SEQ ID NO:14, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12.

16. The modified APMV virus of claim 15 further comprising an isolated polynucleotide inserted in a nonessential region of APMV genome.

17. An isolated polynucleotide selected from the group consisting of:

a) a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1;

b) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2;

c) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4;

d) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6;

e) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8;

f) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10; and

g) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:14, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12.

CLAIMS

What we claim is:

1. An isolated APMV-8 virus comprising a polynucleotide selected from the group consisting of:

a) a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:1;

b) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide having the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:2;

c) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having the sequence as set forth in SEQ ID NO:4, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:4;

d) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:6;

e) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having the sequence as set forth in SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:8;

f) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:10; and

g) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:14, a polynucleotide having the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:12.

2. The isolated APMV-8 virus of claim 1, wherein the polynucleotide has at least 96% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or is complementary to a polynucleotide having at least 96% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1.

3. The isolated APMV-8 virus of claim 1, wherein the polynucleotide encodes a polypeptide having at least 98% sequence identity to a polypeptide having the sequence as set forth in SEQ ID NO:3, or has at least 97% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2, or is complementary to a polynucleotide having at least 97% sequence identity to SEQ ID NO:2.

4. The isolated APMV-8 virus of claim 1, wherein the polynucleotide encodes a polypeptide having at least 95% sequence identity to a polypeptide having the sequence as set forth in SEQ ID NO:5, or has at least 96% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4, or is complementary to a polynucleotide having at least 96% sequence identity to SEQ ID NO:4.

5. The isolated APMV-8 virus of claim 1, wherein the polynucleotide encodes a polypeptide having at least 98% sequence identity to a polypeptide having the sequence as set forth in SEQ ID NO:7, or has at least 97% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6, or is complementary to a polynucleotide having at least 97% sequence identity to SEQ ID NO:6.

6. The isolated APMV-8 virus of claim 1, wherein the polynucleotide encodes a polypeptide having at least 98% sequence identity to a polypeptide having the sequence as set forth in SEQ ID NO:9, or has at least 97% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8, or is complementary to a polynucleotide having at least 97% sequence identity to SEQ ID NO:8.

7. The isolated APMV-8virus of claim 1, wherein the polynucleotide encodes a polypeptide having at least 99% sequence identity to a polypeptide having the sequence as set forth in SEQ ID NO:11, or has at least 97% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10, or is complementary to a polynucleotide having at least 97% sequence identity to SEQ ID NO:10.

8. The isolated APMV-8 virus of claim 1, wherein the polynucleotide encodes a polypeptide having at least 98% sequence identity to a polypeptide having the sequence as set forth in SEQ ID NO:14, or has at least 97% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12, or is complementary to a polynucleotide having at least 97% sequence identity to SEQ ID NO:12.

9. The isolated APMV-8 virus of claim 1 further comprising an isolated polynucleotide inserted in a nonessential region of APMV-8 genome.

10. A composition or vaccine comprising the APMV-8 virus of any one of claims 1 and 3-8.

11. The composition or vaccine of claim 10, wherein the APMV-8 virus further comprises an isolated polynucleotide encoding an antigen, and wherein the polynucleotide is inserted in a nonessential region of the APMV-8 genome.

12. The composition or vaccine of claim 11, wherein the nonessential region is selected from the regions consisting of untranslated region located upstream of the NP open reading frame, intergenic regions between two open reading frames of the APMV-8 genome, and untranslated region located downstream of the L open reading frame.

13. The composition or vaccine of claim 10 further comprising a pharmaceutically or veterinarily acceptable carrier, vehicle, excipient or adjuvant.

14. The composition or vaccine of claim 11, wherein the antigen is from avian pathogens, feline pathogens, canine pathogens, equine pathogens, porcine pathogens, or bovine or ovine pathogens.

15. The composition or vaccine of claim 14, wherein the avian pathogens are selected from the group consisting of Salmonella typhimurium, Salmonella enteritidis, infectious bronchitis virus, Newcastle disease virus, egg drop syndrome virus , infectious bursal disease virus, infectious laryngotracheitis virus, avian adenoviruses, Marek's disease virus, fowlpox virus, duck enteritis virus, duck parvoviruses, avian influenza virus, APMV, and combinations thereof.

16. The composition or vaccine of claim 12, wherein the nonessential region is any region within the nucleotide positions 1-140, 1526-1692, 2910-3085, 4195-4498, 6130-6382, 8116-8272, 8116-8289, or 15013-15342 of SEQ ID NO:1.

17. A method for producing the APMV-8 virus of claim 9, wherein the method comprises the introduction into the APMV-8 genome an isolated polynucleotide in a nonessential region of the APMV-8 genome.

18. The method of claim 17, wherein the nonessential region is selected from the regions consisting of untranslated region located upstream of the NP open reading frame, intergenic regions between two open reading frames of the APMV-8 genome, and untranslated region located downstream of the L open reading frame.

19. The method of claim 17, wherein the method comprises the steps of: a) preparing expression plasmids expressing NP, P and L genes; b) preparing a transcription plasmid comprising an isolated polynucleotide in a nonessential region of the full length APMV-8 genome; c) transfection of the expression plasmids and transcription plasmid into a host cell; d) rescuing/recovering the infectious APMV-8 virus from the host cell.

20. The method of claim 17, wherein the method comprises the steps of:

a) preparing expression plasmids expressing NP, P and L genes;

b) preparing a transcription plasmid comprising an isolated polynucleotide in a nonessential region of the full length APMV-8 genome;

c) preparing an expression plasmid expressing T7 polymerase;

d) transfection of the expression plasmids and transcription plasmid into a host cell;

e) rescuing/recovering the infectious APMV-8 virus from the host cell.

21. The method of claim 18, wherein the nonessential region is any region within the nucleotide positions 1-140, 1526-1692, 2910-3085, 4195-4498, 6130-6382, 8116-8272, 8116-8289, or 15013-15342 of SEQ ID NO:1.

22. The method of claim 19, wherein the NP gene encodes a polypeptide having at least 98% sequence identity to SEQ ID NO:3, and wherein the P gene encodes a polypeptide having at least 95% sequence identity to SEQ ID NO:5, and wherein the L gene encodes a polypeptide having at least 98% sequence identity to SEQ ID NO:14.

23. The method of claim 19, wherein the NP gene has at least 97% sequence identity to SEQ ID NO:2, and wherein the P gene has at least 96% sequence identity to SEQ ID NO:4, and wherein the L gene has at least 97% sequence identity to SEQ ID NO:12.

24. The method of claim 20, wherein the NP gene encodes a polypeptide having at least 98% sequence identity to SEQ ID NO:3, and wherein the P gene encodes a polypeptide having at least 95% sequence identity to SEQ ID NO:5, and wherein the L gene encodes a polypeptide having at least 98% sequence identity to SEQ ID NO:14.

25. The method of claim 20, wherein the NP gene has at least 97% sequence identity to SEQ ID NO:2, and wherein the P gene has at least 96% sequence identity to SEQ ID NO:4, and wherein the L gene has at least 97% sequence identity to SEQ ID NO:12.

26. An isolated polynucleotide selected from the group consisting of:

a) a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:1;

b) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide having the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:2;

c) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having the sequence as set forth in SEQ ID NO:4, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:4;

d) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:6;

e) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having the sequence as set forth in SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:8;

f) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:10; and

g) a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:14, a polynucleotide having the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having the sequence as set forth in SEQ ID NO:12.

27. A composition or vaccine comprising a recombinant APMV viral vector.

28. The composition or vaccine of claim 27, wherein the APMV is APMV-8, APMV-2, APMV-4 or APMV-6.

29. The composition or vaccine of claim 27, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1.

30. The composition or vaccine of claim 27, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:2.

31. The composition or vaccine of claim 27, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:4, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:4.

32. The composition or vaccine of claim 27, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:6.

33. The composition or vaccine of claim 27, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having at least 90% sequence identity the sequence as set forth in SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:8.

34. The composition or vaccine of claim 27, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:10.

35. The composition or vaccine of claim 27, wherein the APMV viral vector comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:14, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:12.

36. The composition or vaccine of claim 27, wherein the APMV viral vector further comprises an isolated polynucleotide encoding an antigen, and wherein the polynucleotide is inserted in a nonessential region of the APMV genome.

37. The composition or vaccine of claim 27, wherein the nonessential region is selected from the regions consisting of untranslated region located upstream of the NP open reading frame, intergenic regions between two open reading frames of the APMV genome, and untranslated region located downstream of the L open reading frame.

38. A method for producing recombinant APMV viral vector, wherein the method comprises the introduction into the APMV genome an isolated polynucleotide in a nonessential region of the APMV genome.

39. The method of claim 38, wherein the APMV is APMV-8, APMV-2, APMV-4 or APMV-6.

40. The method of claim 38, wherein the APMV comprises a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1.

41. The method of claim 38, wherein the nonessential region is selected from the regions consisting of untranslated region located upstream of the NP open reading frame, intergenic regions between two open reading frames of the APMV genome, and untranslated region located downstream of the L open reading frame.

42. The method of claim 38, wherein the method comprises the steps of:

preparing expression plasmids expressing NP, P and L genes;

a) preparing a transcription plasmid comprising an isolated polynucleotide in a nonessential region of the full length APMV genome;

b) transfection of the expression plasmids and transcription plasmid into a host cell;

c) rescuing/recovering the infectious APMV virus from the host cell.

43. The method of claim 38, wherein the method comprises the steps of:

a) preparing expression plasmids expressing NP, P and L genes;

b) preparing a transcription plasmid comprising an isolated polynucleotide in a nonessential region of the full length APMV genome;

c) preparing an expression plasmid expressing T7 polymerase

d) transfection of the expression plasmids and transcription plasmid into a host cell;

d) rescuing/recovering the infectious APMV virus from the host cell.

44. A composition or vaccine comprising a recombinant APMV viral vector for use in inducing an immunological response in an animal to an antigen by inoculation, wherein the recombinant APMV viral vector comprises and expresses the antigen of a pathogen for said animal.

45. The composition or vaccine for the use according to claim 44, wherein the immunological response in an animal to the antigen is induced in a prime-boost regime.

46. The composition or vaccine for the use according to claim 44, wherein the animal is avian, equine, canine, feline, porcine, bovine, ovine, or human.

47. An unmodified or modified APMV virus comprising a polynucleotide selected from the group consisting of:

a) a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1;

b) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2;

c) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4;

d) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6;

e) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8;

f) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10; and

g) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:14, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12.

48. The modified APMV virus of claim 47 further comprising an isolated polynucleotide inserted in a nonessential region of APMV genome.

49. The modified APMV virus of claim 47, wherein the APMV virus comprises a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity the sequence as set forth in SEQ ID NO:1.

50. The modified APMV virus of claim 47, wherein the APMV virus comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:2.

51. The modified APMV virus of claim 47, wherein the APMV virus comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:4, or a polynucleotide

complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:4.

52. The modified APMV virus of claim 47, wherein the APMV virus comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:6.

53. The modified APMV virus of claim 47, wherein the APMV virus comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:8.

54. The modified APMV virus of claim 47, wherein the APMV virus comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:10.

55. The modified APMV virus of claim 47, wherein the APMV virus comprises a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence

as set forth in SEQ ID NO:14, a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to the sequence as set forth in SEQ ID NO:12.

56. An isolated polynucleotide selected from the group consisting of:

a) a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1 or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:1;

b) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:3, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:2;

c) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:5, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:4;

d) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:7, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:6;

e) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:9, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in

SEQ ID NO:8, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:8;

f) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:11, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:10; and

g) a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:13, a polynucleotide having at least 90% sequence identity to a polynucleotide encoding a polypeptide having the sequence as set forth in SEQ ID NO:14, a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12, or a polynucleotide complementary to a polynucleotide having at least 90% sequence identity to a polynucleotide having the sequence as set forth in SEQ ID NO:12.