SEQUENCE LISTING

<110> Merial, Inc.
Wilson, Keith
Lawrence, Paulraj

<120> M Hyo Multivalent Vaccine and Uses Thereof

<130> MER 15-288

<150> 62/272,017
<151> 2015-12-28

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<170> PatentIn version 3.5

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<223> DNA sequence of ORF5 PRRSV

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ttgatttata acctgacgat atgtgagctg aatggcacag attggctaaa caaaagtttt 180

gattgggcgg tggagacctt tgttattttt cctgtgttga ctcatattgt ctcctatggc 240

gccctcacca ccagccattt ccttgacaca gtcggcctga tcaccgtgtc tgccgccgga 300

tattaccacg ggcggtatgt cttgagtagc atttatgccg tctgcgccct ggctgcgtta 360

acttgcttcg tcatcaggct aacaaaaaat tgtatgtcct ggcgttactc atgcaccaga 420

tatactaatt ttcttctgga caccaagggc aaactctatc gttggcggtc tcctgtcatc 480

atagagaaag ggggtaaaat tgaggtcgaa ggtcacctga tcgacctcaa gagagttgtg 540

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<400> 2

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Met Leu Gly Lys Cys Leu Thr Ala Gly Cys Cys Ser Gln Leu Pro Phe
1               5                  10                  15


Leu Trp Cys Ile Val Pro Phe Cys Phe Val Ala Leu Val Asn Ala Asn
            20                  25                  30


Asn Ser Ser Ser Ser His Leu Gln Leu Ile Tyr Asn Leu Thr Ile Cys
        35                  40                  45


Glu Leu Asn Gly Thr Asp Trp Leu Asn Lys Ser Phe Asp Trp Ala Val
    50                  55                  60


Glu Thr Phe Val Ile Phe Pro Val Leu Thr His Ile Val Ser Tyr Gly
65                  70                  75                  80


Ala Leu Thr Thr Ser His Phe Leu Asp Thr Val Gly Leu Ile Thr Val
                85                  90                  95


Ser Ala Ala Gly Tyr Tyr His Gly Arg Tyr Val Leu Ser Ser Ile Tyr
            100                 105                 110


Ala Val Cys Ala Leu Ala Ala Leu Thr Cys Phe Val Ile Arg Leu Thr
        115                 120                 125


Lys Asn Cys Met Ser Trp Arg Tyr Ser Cys Thr Arg Tyr Thr Asn Phe
    130                 135                 140


Leu Leu Asp Thr Lys Gly Lys Leu Tyr Arg Trp Arg Ser Pro Val Ile
145                 150                 155                 160
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Ile Glu Lys Gly Gly Lys Ile Glu Val Glu Gly His Leu Ile Asp Leu
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Lys Arg Val Val Leu Asp Gly Ser Ala Ala Thr Pro Val Thr Lys Val
            180                 185                 190


Ser Ala Glu Gln Trp Gly Arg Pro
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<212>  PRT
<213>  artificial sequence

<220>
<223>  ORF5 PRRSV isolate 14-02094-1

<400>  3

Met Leu Gly Lys Cys Leu Thr Ala Gly Cys Cys Ser Gln Leu Pro Phe
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Leu Trp Cys Ile Val Pro Phe Cys Phe Val Ala Leu Val Asn Ala Asn
            20                  25                  30


Asn Ser Ser Ser Ser His Leu Gln Leu Ile Tyr Asn Leu Thr Ile Cys
        35                  40                  45


Glu Leu Asn Gly Thr Asp Trp Leu Asn Lys Ser Phe Asp Trp Ala Val
    50                  55                  60


Glu Thr Phe Val Ile Phe Pro Val Leu Thr His Ile Val Ser Tyr Gly
65                  70                  75                  80


Ala Leu Thr Thr Ser His Phe Leu Asp Thr Val Gly Leu Ile Thr Val
                85                  90                  95


Ser Ala Ala Gly Tyr Tyr His Gly Arg Tyr Val Leu Ser Ser Ile Tyr
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100 105 110

Ala Val Cys Ala Leu Ala Ala Leu Thr Cys Phe Val Ile Arg Leu Thr
115 120 125

Lys Asn Cys Met Ser Trp Arg Tyr Ser Cys Thr Arg Tyr Thr Asn Phe
130 135 140

Leu Leu Asp Thr Lys Gly Lys Leu Tyr Arg Trp Arg Ser Pro Val Ile
145 150 155 160

Ile Glu Lys Gly Gly Lys Ile Glu Val Glu Gly His Leu Ile Asp Leu
165 170 175

Lys Arg Val Val Leu Asp Gly Ser Ala Ala Thr Pro Val Thr Lys Val
180 185 190

Ser Ala Glu Gln Trp Gly Arg Pro
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<213> artificial sequence

<220>
<223> ORF5 PRRSV isolate S11-1118-1

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Leu Trp Cys Ile Val Pro Phe Cys Phe Ala Ala Leu Val Asn Ala Asn
20 25 30

Ser Asn Ser Ser Ser His Leu Gln Leu Ile Tyr Asn Leu Thr Ile Cys
35 40 45

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Glu Leu Asn Gly Thr Asp Trp Leu Asn Asn Lys Phe Asp Trp Ala Val
    50                  55                  60

Glu Thr Phe Val Ile Phe Pro Val Leu Thr His Ile Val Ser Tyr Gly
65                  70                  75                  80

Ala Leu Thr Thr Ser His Leu Leu Asp Thr Val Gly Leu Ile Thr Val
                85                  90                  95

Ser Thr Ala Gly Tyr Cys His Gly Arg Tyr Val Leu Ser Ser Ile Tyr
            100                 105                 110

Ala Val Cys Ala Leu Ala Ala Leu Ile Cys Phe Ala Ile Arg Leu Ala
        115                 120                 125

Lys Asn Cys Met Ser Trp Arg Tyr Ser Cys Thr Arg Tyr Thr Asn Phe
    130                 135                 140

Leu Leu Asp Thr Lys Gly Lys Leu Tyr Arg Trp Arg Ser Pro Val Ile
145                 150                 155                 160

Ile Glu Lys Gly Gly Lys Val Asp Val Gly Gly His Leu Ile Asp Leu
                165                 170                 175

Lys Arg Val Val Leu Asp Gly Ser Ala Ala Thr Pro Val Thr Lys Ile
            180                 185                 190

Ser Ala Glu Gln Trp Gly Arg Pro
        195                 200
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<213> artificial sequence

<220>
<223> ORF5 PRRSV reference isolate

<400> 5

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Leu Trp Cys Ile Val Pro Phe Cys Phe Ala Ala Leu Val Asn Ala Asn
            20                  25                  30

Ser Ser Ser Ser Ser His Leu Gln Leu Ile Tyr Asn Leu Thr Leu Cys
        35                  40                  45

Glu Leu Asn Gly Thr Asp Trp Leu Asn Asn Lys Phe Asp Trp Ala Val
    50                  55                  60

Glu Thr Phe Val Ile Phe Pro Val Leu Thr His Ile Val Ser Tyr Gly
65                  70                  75                  80

Ala Leu Thr Thr Ser His Phe Leu Asp Thr Val Gly Leu Ile Thr Val
                85                  90                  95

Ser Thr Ala Gly Phe Tyr His Gly Arg Tyr Val Leu Ser Ser Ile Tyr
            100                 105                 110

Ala Val Cys Ala Leu Ala Ala Leu Thr Cys Phe Val Ile Arg Leu Ala
        115                 120                 125

Lys Asn Cys Met Ser Trp Arg Tyr Ser Cys Thr Arg Tyr Thr Asn Phe
    130                 135                 140

Leu Leu Asp Thr Lys Gly Arg Leu Tyr Arg Trp Arg Ser Pro Val Ile
145                 150                 155                 160

Ile Glu Lys Gly Gly Lys Val Glu Val Glu Gly His Leu Ile Asp Leu
                165                 170                 175

Lys Arg Val Val Leu Asp Gly Ser Ala Ala Thr Pro Val Thr Arg Val
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180 185 190

Ser Ala Glu Gln Trp Gly Arg Pro
195 200

<210> 6
<211> 200
<212> PRT
<213> artificial sequence

<220>
<223> ORF5 PRRSV ref. isolate Fostera

<400> 6

Met Leu Gly Lys Cys Leu Thr Ala Gly Cys Cys Ser Arg Leu Leu Ser
1 5 10 15

Leu Trp Cys Ile Val Pro Phe Trp Phe Ala Val Leu Gly Asn Ala Asn
20 25 30

Ser Ser Ser Ser Ser His Phe Gln Leu Ile Tyr Asn Leu Thr Leu Cys
35 40 45

Glu Leu Asn Gly Thr Asp Trp Leu Ala Glu Lys Phe Asp Trp Ala Val
50 55 60

Glu Thr Phe Val Ile Phe Pro Val Leu Thr His Ile Val Ser Tyr Cys
65 70 75 80

Ala Leu Thr Thr Ser His Phe Leu Asp Thr Val Gly Leu Val Thr Val
85 90 95

Ser Thr Ala Gly Phe Tyr His Gly Arg Tyr Val Leu Ser Ser Ile Tyr
100 105 110

Ala Val Cys Ala Leu Ala Ala Leu Ile Cys Phe Val Ile Arg Leu Ala
115 120 125

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Lys Asn Cys Met Ser Trp Arg Tyr Ser Cys Thr Arg Tyr Thr Asn Phe
    130                 135                 140


Leu Leu Asp Thr Lys Gly Arg Leu Tyr Arg Trp Arg Ser Pro Val Ile
145                 150                 155                 160


Ile Glu Lys Arg Gly Lys Val Glu Val Glu Gly His Leu Ile Asp Leu
                165                 170                 175


Lys Arg Val Val Leu Asp Gly Ser Val Ala Thr Pro Leu Thr Arg Val
            180                 185                 190


Ser Ala Glu Gln Trp Gly Arg Leu
        195                 200


<210>  7
<211>  200
<212>  PRT
<213>  artificial sequence

<220>
<223>  ORF5 RespPRRS-BI Ingelvac MLV

<400>  7

Met Leu Glu Lys Cys Leu Thr Ala Gly Cys Cys Ser Gln Leu Leu Ser
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Leu Trp Cys Ile Val Pro Phe Cys Phe Ala Val Leu Ala Asn Ala Ser
            20                  25                  30


Asn Asp Ser Ser Ser His Leu Gln Leu Ile Tyr Asn Leu Thr Leu Cys
        35                  40                  45


Glu Leu Asn Gly Thr Asp Trp Leu Ala Asn Lys Phe Asp Trp Ala Val
    50                  55                  60


Glu Ser Phe Val Ile Phe Pro Val Leu Thr His Ile Val Ser Tyr Gly
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65 70 75 80

Ala Leu Thr Thr Ser His Phe Leu Asp Thr Val Ala Leu Val Thr Val
85 90 95

Ser Thr Ala Gly Phe Val His Gly Arg Tyr Val Leu Ser Ser Ile Tyr
100 105 110

Ala Val Cys Ala Leu Ala Ala Leu Thr Cys Phe Val Ile Arg Phe Ala
115 120 125

Lys Asn Cys Met Ser Trp Arg Tyr Ala Cys Thr Arg Tyr Thr Asn Phe
130 135 140

Leu Leu Asp Thr Lys Gly Gly Leu Tyr Arg Trp Arg Ser Pro Val Ile
145 150 155 160

Ile Glu Lys Arg Gly Lys Val Glu Val Glu Gly His Leu Ile Asp Leu
165 170 175

Lys Arg Val Val Leu Asp Gly Ser Val Ala Thr Pro Ile Thr Arg Val
180 185 190

Ser Ala Glu Gln Trp Gly Arg Pro
195 200

<210> 8
<211> 200
<212> PRT
<213> artificial sequence

<220>
<223> ORF5 PRRS-BI Ingelvac ATP

<400> 8

Met Leu Gly Arg Gly Val Thr Gly Gly Cys Gly Ser Arg Thr Leu Ser
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Val Trp Cys Ile Val Pro Phe Cys Phe Ala Ala Leu Val Asn Ala Asn
            20                  25                  30

Ser Asn Ser Ser Ser His Leu Gln Leu Ile Tyr Asn Leu Thr Leu Cys
        35                  40                  45

Glu Leu Asn Gly Thr Asp Trp Leu Lys Asn Lys Phe Asp Trp Ala Leu
    50                  55                  60

Glu Thr Phe Val Ile Phe Pro Val Leu Thr His Ile Val Ser Tyr Ser
65                  70                  75                  80

Ala Leu Thr Thr Ser His Phe Leu Asp Thr Val Gly Leu Val Thr Val
                85                  90                  95

Ser Thr Ala Gly Phe Tyr His Gly Arg Tyr Val Leu Ser Ser Ile Tyr
            100                 105                 110

Ala Val Cys Ala Leu Ala Ala Leu Thr Cys Phe Val Ile Arg Leu Ala
        115                 120                 125

Lys Asn Cys Met Ser Trp Arg Tyr Ser Cys Thr Arg Tyr Thr Asn Phe
    130                 135                 140

Leu Leu Asp Thr Lys Gly Arg Leu Tyr Arg Trp Arg Ser Pro Val Ile
145                 150                 155                 160

Ile Glu Lys Gly Gly Lys Val Glu Val Glu Gly His Leu Ile Asp Leu
                165                 170                 175

Lys Arg Val Val Leu Asp Gly Ser Val Ala Thr Pro Leu Thr Arg Val
            180                 185                 190

Ser Ala Glu Gln Trp Gly Arg Pro
        195                 200
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<210> 9
<211> 200
<212> PRT
<213> artificial sequence

<220>
<223> ORF5 EURO PRRS Strain Lelystad strain

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Phe Trp Trp Leu Phe Leu Leu Cys Thr Gly Leu Ser Trp Ser Phe Ala
            20                  25                  30


Asp Gly Asn Gly Asp Ser Ser Thr Tyr Gln Tyr Ile Tyr Asn Leu Thr
        35                  40                  45


Ile Cys Glu Leu Asn Gly Thr Asp Trp Leu Ser Ser His Phe Gly Trp
    50                  55                  60


Ala Val Glu Thr Phe Val Leu Tyr Pro Val Ala Thr His Ile Leu Ser
65                  70                  75                  80


Leu Gly Phe Leu Thr Thr Ser His Phe Phe Asp Ala Leu Gly Leu Gly
                85                  90                  95


Ala Val Ser Thr Ala Gly Phe Val Gly Gly Arg Tyr Val Leu Cys Ser
            100                 105                 110


Val Tyr Gly Ala Cys Ala Phe Ala Ala Phe Val Cys Phe Val Ile Arg
        115                 120                 125


Ala Ala Lys Asn Cys Met Ala Cys Arg Tyr Ala Arg Thr Arg Phe Thr
    130                 135                 140


Asn Phe Ile Val Asp Asp Arg Gly Arg Val His Arg Trp Lys Ser Pro
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```
145                 150                 155                 160

Ile Val Val Glu Lys Leu Gly Lys Ala Glu Val Asp Gly Asn Leu Val
                165                 170                 175

Thr Ile Lys His Val Val Leu Glu Gly Val Lys Ala Gln Pro Leu Thr
            180                 185                 190

Arg Thr Ser Ala Glu Gln Trp Glu
        195                 200
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