2577234PCTSequenceListing

SEQUENCE LISTING

<110> Temasek Life Sciences Laboratory Limited

<120> Monovalent H5 Vaccine

<130> 2577-234PCT

<150> US 61/920,187
<151> 2013-12-23

<160> 11

<170> PatentIn version 3.5

<210> 1
<211> 1707
<212> DNA
<213> Avian influenza virus

<220>
<221> CDS
<222> (1)..(1704)

<400> 1

```
atg gag aaa ata gtg ctt ctt ctt gca ata gtc agt ctt gtt aaa agt        48
Met Glu Lys Ile Val Leu Leu Leu Ala Ile Val Ser Leu Val Lys Ser
1               5                  10                  15

gat cag att tgc att ggt tac cat gca aac aat tca aca gag cag gtt        96
Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
            20                  25                  30

gac aca atc atg gaa aag aac gtt act gtt aca cat gcc caa gac ata       144
Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
        35                  40                  45

ctg gaa aag aca cac aac ggg aag ctc tgc gat cta gat gga gtg aag       192
Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
    50                  55                  60

cct cta att tta aga gat tgt agt gta gct gga tgg ctc ctc ggg aac       240
Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
65                  70                  75                  80

cca atg tgt gac gaa ttc atc aat gta ccg gaa tgg tct tac ata gtg       288
Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
                85                  90                  95

gag aag gcc aat cca acc aat gac ctc tgt tac cca ggg agt ttc aac       336
Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
            100                 105                 110

gac tat gaa gaa ctg aaa cat cta ttg agc aga ata aac cat ttt gag       384
Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
        115                 120                 125

aaa att caa atc atc ccc aaa agt tct tgg tcc gat cat gaa gcc tca       432
Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
    130                 135                 140

tca gga gtg agc tca gca tgt cca tac ctg gga agt ccc tcc ttt ttt       480
Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
145                 150                 155                 160

aga aat gtg gta tgg ctt atc aaa aag aac agt aca tac cca aca ata       528
Arg Asn Val Val Trp Leu Ile Lys Lys Asn Ser Thr Tyr Pro Thr Ile
```

```
                165                 170                 175

aag aaa agc tac aat aat acc aac caa gaa gat ctt ttg gta ctg tgg      576
Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
            180                 185                 190

gga att cac cat cct aat gat gcg gca gag cag aca agg cta tat caa      624
Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Arg Leu Tyr Gln
        195                 200                 205

aac cca acc acc tat att tcc att ggg aca tca aca cta aac cag aga      672
Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
    210                 215                 220

ttg gta cca aaa ata gct act aga tcc aaa gta aac ggg caa agt gga      720
Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
225                 230                 235                 240

agg atg gag ttc ttc tgg gca att tta aaa cct aat gat gca atc aac      768
Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
                245                 250                 255

ttc gag agt aat gga aat ttc att gct cca gaa tat gca tac aaa att      816
Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
            260                 265                 270

gtc aag aaa ggg gac tca gca att atg aaa agt gaa ttg gaa tat ggt      864
Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
        275                 280                 285

aac tgc aac acc aag tgt caa act cca atg ggg gcg ata aac tct agt      912
Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser
    290                 295                 300

atg cca ttc cac aac ata cac cct ctc acc atc ggg gaa tgc ccc aaa      960
Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
305                 310                 315                 320

tat gtg aaa tca aac aga tta gtc ctt gca aca ggg ctc aga aat agc     1008
Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
                325                 330                 335

cct caa aga gag agc aga aga aaa aag aga gga cta ttt gga gct ata     1056
Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
            340                 345                 350

gca ggt ttt ata gag gga gga tgg cag gga atg gta gat ggc tgg tat     1104
Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
        355                 360                 365

ggg tac cac cat agc aat gag cag ggg agt ggg tac gct gca gac aaa     1152
Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
    370                 375                 380

gaa tcc act caa aag gca ata gat gga gtc acc aat aag gtc aac tca     1200
Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
385                 390                 395                 400

att att gac aaa atg aac act cag ttt gag gct gtt gga agg gaa ttt     1248
Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
                405                 410                 415

aat aac tta gaa agg aga ata gag aat tta aac aag aag atg gaa gac     1296
Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
            420                 425                 430

ggg ttt cta gat gtt tgg act tat aat gcc gaa ctt ctg gtt ctc atg     1344
Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
```

435 440 445

gaa aat gag aga act cta gac ttt cat gac tca aat gtt aag aac ctc 1392
Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
450 455 460

tac gac aag gtc cga cta cag ctt agg gat aat gca aaa gag ctg ggt 1440
Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
465 470 475 480

aac ggt tgt ttc gag ttc tat cac aaa tgt gat aat gaa tgt atg gaa 1488
Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
485 490 495

agt ata aga aac gga acg tac aac tat ccg cag tat tca gaa gaa gca 1536
Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
500 505 510

aga tta aaa aga gag gaa ata agt ggg gta aaa ttg gaa tca ata gga 1584
Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
515 520 525

act tac caa ata ctg tca att tat tca aca gta gcg agt tcc cta gca 1632
Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
530 535 540

ctg gca atc atg ata gct ggt cta tct tta tgg atg tgc tcc aat gga 1680
Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
545 550 555 560

tcg tta caa tgc aga att tgc att taa 1707
Ser Leu Gln Cys Arg Ile Cys Ile
565

<210> 2
<211> 568
<212> PRT
<213> Avian influenza virus

<400> 2

Met Glu Lys Ile Val Leu Leu Leu Ala Ile Val Ser Leu Val Lys Ser
1 5 10 15

Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
20 25 30

Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
35 40 45

Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
50 55 60

Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
65 70 75 80

Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
85 90 95

Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
100 105 110

```
Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
        115                 120                 125

Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
    130                 135                 140

Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
145                 150                 155                 160

Arg Asn Val Val Trp Leu Ile Lys Lys Asn Ser Thr Tyr Pro Thr Ile
                165                 170                 175

Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
            180                 185                 190

Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Arg Leu Tyr Gln
        195                 200                 205

Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
    210                 215                 220

Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
225                 230                 235                 240

Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
                245                 250                 255

Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
            260                 265                 270

Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
        275                 280                 285

Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser
    290                 295                 300

Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
305                 310                 315                 320

Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
                325                 330                 335

Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
            340                 345                 350

Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
        355                 360                 365

Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
    370                 375                 380
```

```
Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
385                 390                 395                 400

Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
                405                 410                 415

Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
            420                 425                 430

Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
        435                 440                 445

Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
    450                 455                 460

Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
465                 470                 475                 480

Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
                485                 490                 495

Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
            500                 505                 510

Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
        515                 520                 525

Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
    530                 535                 540

Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
545                 550                 555                 560

Ser Leu Gln Cys Arg Ile Cys Ile
                565
```

<210> 3
<211> 1656
<212> DNA
<213> Avian influenza virus

<220>
<221> CDS
<222> (1)..(1656)

<400> 3

```
gat cag att tgc att ggt tac cat gca aac aat tca aca gag cag gtt          48
Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
1               5                   10                  15

gac aca atc atg gaa aag aac gtt act gtt aca cat gcc caa gac ata          96
Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
            20                  25                  30
```

```
ctg gaa aag aca cac aac ggg aag ctc tgc gat cta gat gga gtg aag        144
Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
        35                  40                  45

cct cta att tta aga gat tgt agt gta gct gga tgg ctc ctc ggg aac        192
Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
    50                  55                  60

cca atg tgt gac gaa ttc atc aat gta ccg gaa tgg tct tac ata gtg        240
Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
65                  70                  75                  80

gag aag gcc aat cca acc aat gac ctc tgt tac cca ggg agt ttc aac        288
Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
                85                  90                  95

gac tat gaa gaa ctg aaa cat cta ttg agc aga ata aac cat ttt gag        336
Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
            100                 105                 110

aaa att caa atc atc ccc aaa agt tct tgg tcc gat cat gaa gcc tca        384
Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
        115                 120                 125

tca gga gtg agc tca gca tgt cca tac ctg gga agt ccc tcc ttt ttt        432
Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
    130                 135                 140

aga aat gtg gta tgg ctt atc aaa aag aac agt aca tac cca aca ata        480
Arg Asn Val Val Trp Leu Ile Lys Lys Asn Ser Thr Tyr Pro Thr Ile
145                 150                 155                 160

aag aaa agc tac aat aat acc aac caa gaa gat ctt ttg gta ctg tgg        528
Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
                165                 170                 175

gga att cac cat cct aat gat gcg gca gag cag aca agg cta tat caa        576
Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Arg Leu Tyr Gln
            180                 185                 190

aac cca acc acc tat att tcc att ggg aca tca aca cta aac cag aga        624
Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
        195                 200                 205

ttg gta cca aaa ata gct act aga tcc aaa gta aac ggg caa agt gga        672
Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
    210                 215                 220

agg atg gag ttc ttc tgg gca att tta aaa cct aat gat gca atc aac        720
Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
225                 230                 235                 240

ttc gag agt aat gga aat ttc att gct cca gaa tat gca tac aaa att        768
Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
                245                 250                 255

gtc aag aaa ggg gac tca gca att atg aaa agt gaa ttg gaa tat ggt        816
Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
            260                 265                 270

aac tgc aac acc aag tgt caa act cca atg ggg gcg ata aac tct agt        864
Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser
        275                 280                 285

atg cca ttc cac aac ata cac cct ctc acc atc ggg gaa tgc ccc aaa        912
Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
    290                 295                 300
```

```
tat gtg aaa tca aac aga tta gtc ctt gca aca ggg ctc aga aat agc        960
Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
305                 310                 315                 320

cct caa aga gag agc aga aga aaa aag aga gga cta ttt gga gct ata       1008
Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
                325                 330                 335

gca ggt ttt ata gag gga gga tgg cag gga atg gta gat ggc tgg tat       1056
Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
            340                 345                 350

ggg tac cac cat agc aat gag cag ggg agt ggg tac gct gca gac aaa       1104
Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
        355                 360                 365

gaa tcc act caa aag gca ata gat gga gtc acc aat aag gtc aac tca       1152
Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
    370                 375                 380

att att gac aaa atg aac act cag ttt gag gct gtt gga agg gaa ttt       1200
Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
385                 390                 395                 400

aat aac tta gaa agg aga ata gag aat tta aac aag aag atg gaa gac       1248
Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
                405                 410                 415

ggg ttt cta gat gtt tgg act tat aat gcc gaa ctt ctg gtt ctc atg       1296
Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
            420                 425                 430

gaa aat gag aga act cta gac ttt cat gac tca aat gtt aag aac ctc       1344
Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
        435                 440                 445

tac gac aag gtc cga cta cag ctt agg gat aat gca aaa gag ctg ggt       1392
Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
    450                 455                 460

aac ggt tgt ttc gag ttc tat cac aaa tgt gat aat gaa tgt atg gaa       1440
Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
465                 470                 475                 480

agt ata aga aac gga acg tac aac tat ccg cag tat tca gaa gaa gca       1488
Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
                485                 490                 495

aga tta aaa aga gag gaa ata agt ggg gta aaa ttg gaa tca ata gga       1536
Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
            500                 505                 510

act tac caa ata ctg tca att tat tca aca gta gcg agt tcc cta gca       1584
Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
        515                 520                 525

ctg gca atc atg ata gct ggt cta tct tta tgg atg tgc tcc aat gga       1632
Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
    530                 535                 540

tcg tta caa tgc aga att tgc att                                      1656
Ser Leu Gln Cys Arg Ile Cys Ile
545                 550
```

<210> 4
<211> 552

<212> PRT
<213> Avian influenza virus

<400> 4

```
Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
1               5                  10                  15

Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
            20                  25                  30

Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
        35                  40                  45

Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
    50                  55                  60

Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
65                  70                  75                  80

Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
                85                  90                  95

Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
            100                 105                 110

Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
        115                 120                 125

Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
    130                 135                 140

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

Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
                165                 170                 175

Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Arg Leu Tyr Gln
            180                 185                 190

Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
        195                 200                 205

Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
    210                 215                 220

Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
225                 230                 235                 240

Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
                245                 250                 255
```

Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
260 265 270

Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser
275 280 285

Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
290 295 300

Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
305 310 315 320

Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
325 330 335

Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
340 345 350

Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
355 360 365

Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
370 375 380

Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
385 390 395 400

Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
405 410 415

Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
420 425 430

Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
435 440 445

Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
450 455 460

Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
465 470 475 480

Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
485 490 495

Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
500 505 510

Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
515 520 525

```
Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
    530                 535                 540

Ser Leu Gln Cys Arg Ile Cys Ile
545                 550
```

<210> 5
<211> 1656
<212> DNA
<213> Avian influenza virus

<220>
<221> CDS
<222> (1)..(1656)

<400> 5

```
gat cag att tgc att ggt tac cat gca aac aat tca aca gag cag gtt          48
Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
1               5                   10                  15

gac aca atc atg gaa aag aac gtt act gtt aca cat gcc caa gac ata          96
Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
            20                  25                  30

ctg gaa aag aca cac aac ggg aag ctc tgc gat cta gat gga gtg aag         144
Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
        35                  40                  45

cct cta att tta aga gat tgt agt gta gct gga tgg ctc ctc ggg aac         192
Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
    50                  55                  60

cca atg tgt gac gaa ttc atc aat gta ccg gaa tgg tct tac ata gtg         240
Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
65                  70                  75                  80

gag aag gcc aat cca acc aat gac ctc tgt tac cca ggg agt ttc aac         288
Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
                85                  90                  95

gac tat gaa gaa ctg aaa cat cta ttg agc aga ata aac cat ttt gag         336
Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
            100                 105                 110

aaa att caa atc atc ccc aaa agt tct tgg tcc gat cat gaa gcc tca         384
Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
        115                 120                 125

tca gga gtg agc tca gca tgt cca tac ctg gga agt ccc tcc ttt ttt         432
Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
    130                 135                 140

aga aat gtg gta tgg ctt atc aaa aag aac aat gca tac cca aca ata         480
Arg Asn Val Val Trp Leu Ile Lys Lys Asn Asn Ala Tyr Pro Thr Ile
145                 150                 155                 160

aag aaa agc tac aat aat acc aac caa gaa gat ctt ttg gta ctg tgg         528
Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
                165                 170                 175

gga att cac cat cct aat gat gcg gca gag cag aca aag cta tat caa         576
Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Lys Leu Tyr Gln
            180                 185                 190
```

```
aac cca acc acc tat att tcc att ggg aca tca aca cta aac cag aga        624
Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
        195                 200                 205

ttg gta cca aaa ata gct act aga tcc aaa gta aac ggg caa agt gga        672
Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
    210                 215                 220

agg atg gag ttc ttc tgg gca att tta aaa cct aat gat gca atc aac        720
Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
225                 230                 235                 240

ttc gag agt aat gga aat ttc att gct cca gaa tat gca tac aaa att        768
Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
                245                 250                 255

gtc aag aaa ggg gac tca gca att atg aaa agt gaa ttg gaa tat ggt        816
Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
            260                 265                 270

aac tgc aac acc aag tgt caa act cca atg ggg gcg ata aac tct agt        864
Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser
        275                 280                 285

atg cca ttc cac aac ata cac cct ctc acc atc ggg gaa tgc ccc aaa        912
Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
    290                 295                 300

tat gtg aaa tca aac aga tta gtc ctt gca aca ggg ctc aga aat agc        960
Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
305                 310                 315                 320

cct caa aga gag agc aga aga aaa aag aga gga cta ttt gga gct ata       1008
Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
                325                 330                 335

gca ggt ttt ata gag gga gga tgg cag gga atg gta gat ggc tgg tat       1056
Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
            340                 345                 350

ggg tac cac cat agc aat gag cag ggg agt ggg tac gct gca gac aaa       1104
Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
        355                 360                 365

gaa tcc act caa aag gca ata gat gga gtc acc aat aag gtc aac tca       1152
Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
    370                 375                 380

att att gac aaa atg aac act cag ttt gag gct gtt gga agg gaa ttt       1200
Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
385                 390                 395                 400

aat aac tta gaa agg aga ata gag aat tta aac aag aag atg gaa gac       1248
Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
                405                 410                 415

ggg ttt cta gat gtt tgg act tat aat gcc gaa ctt ctg gtt ctc atg       1296
Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
            420                 425                 430

gaa aat gag aga act cta gac ttt cat gac tca aat gtt aag aac ctc       1344
Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
        435                 440                 445

tac gac aag gtc cga cta cag ctt agg gat aat gca aaa gag ctg ggt       1392
Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
    450                 455                 460
```

```
aac ggt tgt ttc gag ttc tat cac aaa tgt gat aat gaa tgt atg gaa       1440
Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
465                 470                 475                 480

agt ata aga aac gga acg tac aac tat ccg cag tat tca gaa gaa gca       1488
Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
                485                 490                 495

aga tta aaa aga gag gaa ata agt ggg gta aaa ttg gaa tca ata gga       1536
Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
            500                 505                 510

act tac caa ata ctg tca att tat tca aca gta gcg agt tcc cta gca       1584
Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
        515                 520                 525

ctg gca atc atg ata gct ggt cta tct tta tgg atg tgc tcc aat gga       1632
Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
    530                 535                 540

tcg tta caa tgc aga att tgc att                                      1656
Ser Leu Gln Cys Arg Ile Cys Ile
545                 550
```

<210> 6
<211> 552
<212> PRT
<213> Avian influenza virus

<400> 6

```
Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
1               5                   10                  15

Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
            20                  25                  30

Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
        35                  40                  45

Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
    50                  55                  60

Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
65                  70                  75                  80

Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
                85                  90                  95

Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
            100                 105                 110

Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
        115                 120                 125

Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
    130                 135                 140
```

Arg Asn Val Val Trp Leu Ile Lys Lys Asn Asn Ala Tyr Pro Thr Ile
145 150 155 160

Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
165 170 175

Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Lys Leu Tyr Gln
180 185 190

Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
195 200 205

Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
210 215 220

Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
225 230 235 240

Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
245 250 255

Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
260 265 270

Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser
275 280 285

Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
290 295 300

Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
305 310 315 320

Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
325 330 335

Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
340 345 350

Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
355 360 365

Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
370 375 380

Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
385 390 395 400

Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
405 410 415

Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
420 425 430

Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
435 440 445

Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
450 455 460

Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
465 470 475 480

Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
485 490 495

Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
500 505 510

Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
515 520 525

Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
530 535 540

Ser Leu Gln Cys Arg Ile Cys Ile
545 550

<210> 7
<211> 1707
<212> DNA
<213> Avian influenza virus

<220>
<221> CDS
<222> (1)..(1704)

<400> 7
atg gag aaa ata gtg ctt ctt ctt gca ata gtc agt ctt gtt aaa agt 48
Met Glu Lys Ile Val Leu Leu Leu Ala Ile Val Ser Leu Val Lys Ser
1 5 10 15

gat cag att tgc att ggt tac cat gca aac aat tca aca gag cag gtt 96
Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
20 25 30

gac aca atc atg gaa aag aac gtt act gtt aca cat gcc caa gac ata 144
Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
35 40 45

ctg gaa aag aca cac aac ggg aag ctc tgc gat cta gat gga gtg aag 192
Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
50 55 60

cct cta att tta aga gat tgt agt gta gct gga tgg ctc ctc ggg aac 240
Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
65 70 75 80

cca atg tgt gac gaa ttc atc aat gta ccg gaa tgg tct tac ata gtg 288

```
Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
                85                  90                  95

gag aag gcc aat cca acc aat gac ctc tgt tac cca ggg agt ttc aac  336
Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
            100                 105                 110

gac tat gaa gaa ctg aaa cat cta ttg agc aga ata aac cat ttt gag  384
Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
        115                 120                 125

aaa att caa atc atc ccc aaa agt tct tgg tcc gat cat gaa gcc tca  432
Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
    130                 135                 140

tca gga gtg agc tca gca tgt cca tac ctg gga agt ccc tcc ttt ttt  480
Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
145                 150                 155                 160

aga aat gtg gta tgg ctt atc aaa aag aac aat gca tac cca aca ata  528
Arg Asn Val Val Trp Leu Ile Lys Lys Asn Asn Ala Tyr Pro Thr Ile
                165                 170                 175

aag aaa agc tac aat aat acc aac caa gaa gat ctt ttg gta ctg tgg  576
Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
            180                 185                 190

gga att cac cat cct aat gat gcg gca gag cag aca aag cta tat caa  624
Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Lys Leu Tyr Gln
        195                 200                 205

aac cca acc acc tat att tcc att ggg aca tca aca cta aac cag aga  672
Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
    210                 215                 220

ttg gta cca aaa ata gct act aga tcc aaa gta aac ggg caa agt gga  720
Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
225                 230                 235                 240

agg atg gag ttc ttc tgg gca att tta aaa cct aat gat gca atc aac  768
Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
                245                 250                 255

ttc gag agt aat gga aat ttc att gct cca gaa tat gca tac aaa att  816
Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
            260                 265                 270

gtc aag aaa ggg gac tca gca att atg aaa agt gaa ttg gaa tat ggt  864
Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
        275                 280                 285

aac tgc aac acc aag tgt caa act cca atg ggg gcg ata aac tct agt  912
Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser
    290                 295                 300

atg cca ttc cac aac ata cac cct ctc acc atc ggg gaa tgc ccc aaa  960
Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
305                 310                 315                 320

tat gtg aaa tca aac aga tta gtc ctt gca aca ggg ctc aga aat agc 1008
Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
                325                 330                 335

cct caa aga gag agc aga aga aaa aag aga gga cta ttt gga gct ata 1056
Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
            340                 345                 350

gca ggt ttt ata gag gga gga tgg cag gga atg gta gat ggc tgg tat 1104
```

```
Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
        355                 360                 365

ggg tac cac cat agc aat gag cag ggg agt ggg tac gct gca gac aaa      1152
Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
    370                 375                 380

gaa tcc act caa aag gca ata gat gga gtc acc aat aag gtc aac tca      1200
Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
385                 390                 395                 400

att att gac aaa atg aac act cag ttt gag gct gtt gga agg gaa ttt      1248
Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
                405                 410                 415

aat aac tta gaa agg aga ata gag aat tta aac aag aag atg gaa gac      1296
Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
            420                 425                 430

ggg ttt cta gat gtt tgg act tat aat gcc gaa ctt ctg gtt ctc atg      1344
Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
        435                 440                 445

gaa aat gag aga act cta gac ttt cat gac tca aat gtt aag aac ctc      1392
Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
    450                 455                 460

tac gac aag gtc cga cta cag ctt agg gat aat gca aaa gag ctg ggt      1440
Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
465                 470                 475                 480

aac ggt tgt ttc gag ttc tat cac aaa tgt gat aat gaa tgt atg gaa      1488
Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
                485                 490                 495

agt ata aga aac gga acg tac aac tat ccg cag tat tca gaa gaa gca      1536
Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
            500                 505                 510

aga tta aaa aga gag gaa ata agt ggg gta aaa ttg gaa tca ata gga      1584
Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
        515                 520                 525

act tac caa ata ctg tca att tat tca aca gta gcg agt tcc cta gca      1632
Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
    530                 535                 540

ctg gca atc atg ata gct ggt cta tct tta tgg atg tgc tcc aat gga      1680
Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
545                 550                 555                 560

tcg tta caa tgc aga att tgc att taa                                 1707
Ser Leu Gln Cys Arg Ile Cys Ile
                565
```

<210> 8
<211> 568
<212> PRT
<213> Avian influenza virus

<400> 8

```
Met Glu Lys Ile Val Leu Leu Leu Ala Ile Val Ser Leu Val Lys Ser
1               5                   10                  15

Asp Gln Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Glu Gln Val
```

20 25 30

Asp Thr Ile Met Glu Lys Asn Val Thr Val Thr His Ala Gln Asp Ile
35 40 45

Leu Glu Lys Thr His Asn Gly Lys Leu Cys Asp Leu Asp Gly Val Lys
50 55 60

Pro Leu Ile Leu Arg Asp Cys Ser Val Ala Gly Trp Leu Leu Gly Asn
65 70 75 80

Pro Met Cys Asp Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
85 90 95

Glu Lys Ala Asn Pro Thr Asn Asp Leu Cys Tyr Pro Gly Ser Phe Asn
100 105 110

Asp Tyr Glu Glu Leu Lys His Leu Leu Ser Arg Ile Asn His Phe Glu
115 120 125

Lys Ile Gln Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser
130 135 140

Ser Gly Val Ser Ser Ala Cys Pro Tyr Leu Gly Ser Pro Ser Phe Phe
145 150 155 160

Arg Asn Val Val Trp Leu Ile Lys Lys Asn Asn Ala Tyr Pro Thr Ile
165 170 175

Lys Lys Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp
180 185 190

Gly Ile His His Pro Asn Asp Ala Ala Glu Gln Thr Lys Leu Tyr Gln
195 200 205

Asn Pro Thr Thr Tyr Ile Ser Ile Gly Thr Ser Thr Leu Asn Gln Arg
210 215 220

Leu Val Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly
225 230 235 240

Arg Met Glu Phe Phe Trp Ala Ile Leu Lys Pro Asn Asp Ala Ile Asn
245 250 255

Phe Glu Ser Asn Gly Asn Phe Ile Ala Pro Glu Tyr Ala Tyr Lys Ile
260 265 270

Val Lys Lys Gly Asp Ser Ala Ile Met Lys Ser Glu Leu Glu Tyr Gly
275 280 285

Asn Cys Asn Thr Lys Cys Gln Thr Pro Met Gly Ala Ile Asn Ser Ser

290 295 300

Met Pro Phe His Asn Ile His Pro Leu Thr Ile Gly Glu Cys Pro Lys
305 310 315 320

Tyr Val Lys Ser Asn Arg Leu Val Leu Ala Thr Gly Leu Arg Asn Ser
325 330 335

Pro Gln Arg Glu Ser Arg Arg Lys Lys Arg Gly Leu Phe Gly Ala Ile
340 345 350

Ala Gly Phe Ile Glu Gly Gly Trp Gln Gly Met Val Asp Gly Trp Tyr
355 360 365

Gly Tyr His His Ser Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Lys
370 375 380

Glu Ser Thr Gln Lys Ala Ile Asp Gly Val Thr Asn Lys Val Asn Ser
385 390 395 400

Ile Ile Asp Lys Met Asn Thr Gln Phe Glu Ala Val Gly Arg Glu Phe
405 410 415

Asn Asn Leu Glu Arg Arg Ile Glu Asn Leu Asn Lys Lys Met Glu Asp
420 425 430

Gly Phe Leu Asp Val Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Met
435 440 445

Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
450 455 460

Tyr Asp Lys Val Arg Leu Gln Leu Arg Asp Asn Ala Lys Glu Leu Gly
465 470 475 480

Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu
485 490 495

Ser Ile Arg Asn Gly Thr Tyr Asn Tyr Pro Gln Tyr Ser Glu Glu Ala
500 505 510

Arg Leu Lys Arg Glu Glu Ile Ser Gly Val Lys Leu Glu Ser Ile Gly
515 520 525

Thr Tyr Gln Ile Leu Ser Ile Tyr Ser Thr Val Ala Ser Ser Leu Ala
530 535 540

Leu Ala Ile Met Ile Ala Gly Leu Ser Leu Trp Met Cys Ser Asn Gly
545 550 555 560

Ser Leu Gln Cys Arg Ile Cys Ile

<210> 9
<211> 12
<212> PRT
<213> Avian influenza virus

<400> 9

Glu Phe Ile Asn Val Pro Glu Trp Ser Tyr Ile Val
1 5 10

<210> 10
<211> 48
<212> PRT
<213> Avian influenza virus

<400> 10

Ile Ile Pro Lys Ser Ser Trp Ser Asp His Glu Ala Ser Ser Gly Val
1 5 10 15

Ser Ser Ala Cys Pro Tyr Gln Gly Arg Ser Ser Phe Phe Arg Asn Val
20 25 30

Val Trp Leu Ile Lys Lys Asn Asn Thr Tyr Pro Thr Ile Lys Arg Ser
35 40 45

<210> 11
<211> 78
<212> PRT
<213> Avian influenza virus

<400> 11

Ser Tyr Asn Asn Thr Asn Gln Glu Asp Leu Leu Val Leu Trp Gly Ile
1 5 10 15

His His Pro Asn Asp Ala Ala Glu Gln Thr Arg Leu Tyr Gln Asn Pro
20 25 30

Thr Thr Tyr Ile Ser Val Gly Thr Ser Thr Leu Asn Gln Arg Leu Val
35 40 45

Pro Lys Ile Ala Thr Arg Ser Lys Val Asn Gly Gln Ser Gly Arg Met
50 55 60

Glu Phe Phe Trp Thr Ile Leu Lys Pro Asn Asp Ala Ile Asn
65 70 75