

3757454\_1.txt  
SEQUENCE LISTING

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<120> Attenuated Bacterium

<130> 74767PCT1

<160> 78

<170> PatentIn version 3.5

<210> 1

<211> 1872

<212> DNA

<213> *Piscirickettsia salmonis*

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 ctagaggaag ttggcaaaca atttgacgta actcgcgagc gtattcgcca aattgaagcc 1800  
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<220>  
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<220>  
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<400> 3  
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 <211> 657  
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 <213> *Piscirickettsia salmonis*

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 catccaaaat tatctttaat agaaagcaag ataccttttt taaaagtggg aatgaaaggg 420  
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 gaattagaaa aaagtcaatt ttttagtgat atttctataa agataaatat agatttctat 600  
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 <211> 22  
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<220>  
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<210> 7  
 <211> 951  
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 <213> Piscirickettsia salmonis

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 gcaaccctta aaactgacca tgatactcac catctggagc aaatttttagc caatcgaacg 240  
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 gcgaataata gcggcttatt gcatcgatta cgtttcattg agcaacaaaa tcaacaacgc 900  
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<210> 8  
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&lt;220&gt;

&lt;223&gt; PCR Primer: Forward ATP-grasp domain protein

&lt;400&gt; 8

ggtgagcggtt ttcgcaaagt

20

&lt;210&gt; 9

&lt;211&gt; 20

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; PCR Primer: Reverse ATP-grasp domain protein

&lt;400&gt; 9

tcaagcatga gtgggccttt

20

&lt;210&gt; 10

&lt;211&gt; 1983

&lt;212&gt; DNA

<213> *Piscirickettsia salmonis*

&lt;400&gt; 10

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atcaataatg gtcaagtaaa aagcgttatc attgatgggt tgaatattaa aggacaaacc 180

tcaagtggga cgccatttgc tacttatatt ccgtggaaag atccattttt aatggatcag 240

atgctggcga aaaatgtcac aattgctgct aaaccacctg agcagcggag ctggttattg 300

tctgcattaa tcagttgggt ccctggtatt ttattaattg cgatttggat tttcttcttg 360

cggcagatgc aaggcgggtg tggtggtaag ggcattgatgt cctttgggtc cagtaaggca 420

cgtctgcttg gtgaagatca aattaaagt aaactttgctg atgttgctgg ctgtgaagag 480

gctaaagaag aagtaaaaga actggtcgat tttctgcgtg acccaaccaa attccaaaag 540

ttaggcggca aaattccgca aggggtattg atagtggcc cacctggaac aggtgaagacg 600

ctattagcta aagccattgc aggtgaggcg aaagtcccgt tcttttctat ttcaggctct 660

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taa 1983

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<210> 11
<211> 20
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<220>
<223> PCR Primer: Forward FtSH

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<210> 12
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<212> DNA
<213> Artificial Sequence

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<220>
<223> PCR Primer: Reverse FtSH

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<400> 12
acaatcacc cttcggttcc 20

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<210> 13
<211> 623
<212> PRT
<213> Piscirickettsia salmonis

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<400> 13

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Gly Lys Gln Gln Gly Phe Leu Thr Phe Thr Glu Val Asn Asp His Leu
          20          25          30

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Pro Asp Asp Met Ser Ser Pro Glu Glu Val Glu Glu Ile Val Ala Met
          35          40          45

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 85 90 95  
 Asp Pro Val Arg Met Tyr Met Arg Glu Met Gly Ser Val Glu Leu Leu  
 100 105 110  
 Thr Arg Gln Gly Glu Ile Glu Leu Ala Lys Arg Ile Glu Glu Gly Val  
 115 120 125  
 Lys Gln Ala Phe Glu Ala Ile Ala His Tyr Pro Gln Ser Thr Ala Ile  
 130 135 140  
 Ile Leu Glu Glu Tyr Ala Arg Phe Glu Ala Glu Glu Ile Arg Leu Asp  
 145 150 155 160  
 Asp Ile Ile Ser Gly Tyr Ile Thr Glu Glu Asp Glu Ala Pro Thr Ser  
 165 170 175  
 Asn Ile Gly Ser Met Leu Asp Asp Ala Asn Lys Ala Asp Asp Asn Phe  
 180 185 190  
 Glu Ala Ala Leu Thr Glu Asp Asp Ser Thr Asp Asp Gly Glu Gly Glu  
 195 200 205  
 Asp Asp Asn Glu Glu Ile Pro Val Asp Asn Thr Leu Asp Val Glu Glu  
 210 215 220  
 Ala Ala Glu Arg Phe Ala Glu Leu Lys Ala Ala Tyr Asp Ala Val Ile  
 225 230 235 240  
 Gln Val Gln Glu Lys His Gly Ile His His Lys Lys Thr Gln Gln Arg  
 245 250 255  
 Cys Glu Glu Leu Ser Lys Val Leu Met Thr Phe Arg Leu Lys Pro Asn  
 260 265 270  
 Met Ile Asp Lys Ile Thr Asn Tyr Leu His Gly Leu Leu Ser Gln Val  
 275 280 285  
 Arg Lys His Glu Arg His Ile Met Ala Leu Cys Ile Asn Gln Ala Lys  
 290 295 300  
 Met Pro Arg Lys Leu Phe Ile Asp Ile Phe Pro Gly Asn Glu Thr Asn  
 305 310 315 320

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Leu Glu Trp Ile Glu Tyr Gln Ile Lys Ala Glu Gln Ser Tyr Ser Glu  
 325 330 335  
 Ala Leu Gln Ser Leu Ala Pro Glu Val Thr Arg Ala Gln Lys Lys Leu  
 340 345 350  
 Ile Ser Leu Glu Gln Glu Ser Asn Phe Asp Val Thr Ala Ile Lys Glu  
 355 360 365  
 Val Asn Arg Asn Ile Ser Ile Gly Glu Ala Lys Ala His Arg Ala Lys  
 370 375 380  
 Lys Glu Met Val Glu Ala Asn Leu Arg Leu Val Ile Ser Ile Ala Lys  
 385 390 395 400  
 Lys Tyr Thr Asn Arg Gly Leu Gln Phe Leu Asp Leu Ile Gln Glu Gly  
 405 410 415  
 Asn Ile Gly Leu Met Lys Ala Val Asp Lys Phe Glu Tyr Arg Arg Gly  
 420 425 430  
 Tyr Lys Phe Ser Thr Tyr Ala Thr Trp Trp Ile Arg Gln Ala Ile Thr  
 435 440 445  
 Arg Ser Ile Ala Asp Gln Ala Arg Thr Ile Arg Ile Pro Val His Met  
 450 455 460  
 Ile Glu Thr Ile Asn Lys Leu Asn Cys Val Ser Arg Gln Met Ile Gln  
 465 470 475 480  
 Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu Arg Met Glu  
 485 490 495  
 Met Pro Glu His Lys Ile Arg Lys Ile Leu Lys Ile Ala Lys Glu Pro  
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 Ile Ser Met Glu Thr Pro Ile Gly Asp Asp Glu Asp Ser His Leu Gly  
 515 520 525  
 Asp Phe Ile Glu Asp Thr Thr Met Gln Leu Pro Val Asp Ser Thr Met  
 530 535 540  
 Gly Asp Ala Leu Lys Gln Ala Thr Ser Asp Ile Leu Glu Asn Leu Thr  
 545 550 555 560  
 Pro Arg Glu Ala Lys Val Leu Arg Met Arg Phe Gly Ile Asp Met Asn  
 565 570 575  
 Thr Asp His Thr Leu Glu Glu Val Gly Lys Gln Phe Asp Val Thr Arg  
 580 585 590

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Glu Arg Ile Arg Gln Ile Glu Ala Lys Ala Leu Arg Lys Leu Arg His  
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Pro Thr Arg Ser Glu Ile Leu Lys Ser Phe Leu Asp Ser Glu Glu  
610 615 620

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<212> PRT  
<213> Piscirickettsia salmonis

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Pro Asp Asp Met Ser Ser Pro Glu Glu Val Glu Glu Ile Val Ala Met  
35 40 45

Ile Ser Asp Met Gly Ile Pro Val Tyr Glu Thr Ala Pro Asp Pro Asp  
50 55 60

Ser Leu Leu Met Asn Glu His Ala Ser Ser Ala Glu Asp Asp Ala Asp  
65 70 75 80

Asp Ala Val Ala Ala Leu Asp Ser Asp Ala Glu Phe Gly Arg Thr Thr  
85 90 95

Asp Pro Val Arg Met Tyr Met Arg Glu Met Gly Ser Val Glu Leu Leu  
100 105 110

Thr Arg Gln Gly Glu Ile Glu Leu Ala Lys Arg Ile Glu Glu Gly Val  
115 120 125

Lys Gln Ala Phe Glu Ala Ile Ala His Tyr Pro Gln Ser Thr Ala Ile  
130 135 140

Ile Leu Glu Glu Tyr Ala Arg Phe Glu Ala Glu Glu Ile Arg Leu Asp  
145 150 155 160

Asp Ile Ile Ser Gly Tyr Ile Thr Glu Glu Asp Glu Ala Pro Thr Ser  
165 170 175

Asn Ile Gly Ser Met Leu Asp Asp Ala Asn Lys Ala Asp Asp Asn Phe  
180 185 190

Glu Ala Ala Leu Thr Glu Asp Asp Ser Thr Asp Asp Gly Glu Gly Glu  
195 200 205



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Asp Asp Asn Glu Glu Ile Pro Val Asp Asn Thr Leu Asp Val Glu Glu  
 210 215 220  
 Ala Ala Glu Arg Phe Ala Glu Leu Lys Ala Ala Tyr Asp Ala Val Ile  
 225 230 235 240  
 Gln Val Gln Glu Lys His Gly Ile His His Lys Lys Thr Gln Gln Arg  
 245 250 255  
 Cys Glu Glu Leu Ser Lys Val Leu Met Thr Phe Arg Leu Lys Pro Asn  
 260 265 270  
 Met Ile Asp Lys Ile Thr Asn Tyr Leu His Gly Leu Leu Ser Gln Val  
 275 280 285  
 Arg Lys His Glu Arg His Ile Met Ala Leu Cys Ile Asn Gln Ala Lys  
 290 295 300  
 Met Pro Arg Lys Leu Phe Ile Asp Ile Phe Pro Gly Asn Glu Thr Asn  
 305 310 315 320  
 Leu Glu Trp Ile Glu Tyr Gln Ile Lys Ala Glu Gln Ser Tyr Ser Glu  
 325 330 335  
 Ala Leu Gln Ser Leu Ala Pro Glu Val Thr Arg Ala Gln Lys Lys Leu  
 340 345 350  
 Ile Ser Leu Glu Gln Glu Ser Asn Phe Asp Val Thr Ala Ile Lys Glu  
 355 360 365  
 Val Asn Arg Asn Ile Ser Ile Gly Glu Ala Lys Ala His Arg Ala Lys  
 370 375 380  
 Lys Glu Met Val Glu Ala Asn Leu Arg Leu Val Ile Ser Ile Ala Lys  
 385 390 395 400  
 Lys Tyr Thr Asn Arg Gly Leu Gln Phe Leu Asp Leu Ile Gln Glu Gly  
 405 410 415  
 Asn Ile Gly Leu Met Lys Ala Val Asp Lys Phe Glu Tyr Arg Arg Gly  
 420 425 430  
 Tyr Lys Phe Ser Thr Tyr Ala Thr Trp Trp Ile Arg Gln Ala Ile Thr  
 435 440 445  
 Arg Ser Ile Ala Asp Gln Ala Arg Thr Ile Arg Ile Pro Val His Met  
 450 455 460  
 Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln Met Ile Gln  
 465 470 475 480

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Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu Arg Met Glu  
485 490 495

Met Pro Glu His Lys Ile Arg Lys Ile Leu Lys Ile Ala Lys Glu Pro  
500 505 510

Ile Ser Met Glu Thr Pro Ile Gly Asp Asp Glu Asp Ser His Leu Gly  
515 520 525

Asp Phe Ile Glu Asp Thr Thr Met Gln Leu Pro Val Asp Ser Thr Met  
530 535 540

Gly Asp Ala Leu Lys Gln Ala Thr Ser Asp Ile Leu Glu Asn Leu Thr  
545 550 555 560

Pro Arg Glu Ala Lys Val Leu Arg Met Arg Phe Gly Ile Asp Met Asn  
565 570 575

Thr Asp His Thr Leu Glu Glu Val Gly Lys Gln Phe Asp Val Thr Arg  
580 585 590

Glu Arg Ile Arg Gln Ile Glu Ala Lys Ala Leu Arg Lys Leu Arg His  
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Pro Thr Arg Ser Glu Ile Leu Lys Ser Phe Leu Asp Ser Glu Glu  
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<212> PRT

<213> Piscirickettsia salmonis

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Pro Asp Asp Met Ser Ser Pro Glu Glu Val Glu Glu Ile Val Ala Met  
35 40 45

Ile Ser Asp Met Gly Ile Pro Val Tyr Glu Thr Ala Pro Asp Pro Asp  
50 55 60

Ser Leu Leu Met Asn Glu His Ala Ser Ser Ala Glu Asp Asp Ala Asp  
65 70 75 80

Asp Ala Val Ala Ala Leu Gly Ser Asp Ala Glu Phe Gly Arg Thr Thr  
85 90 95

Asp Pro Val Arg Met Tyr Met Arg Glu Met Gly Ser Val Glu Leu Leu  
Page 10

Thr Arg Gln Gly Glu Ile Glu Leu Ala Lys Arg Ile Glu Glu Gly Val  
 115 120 125  
 Lys Gln Ala Phe Glu Ala Ile Ala His Tyr Pro Gln Ser Thr Ala Ile  
 130 135 140  
 Ile Leu Glu Glu Tyr Ala Arg Phe Glu Ala Glu Glu Ile Arg Leu Asp  
 145 150 155 160  
 Asp Ile Ile Ser Gly Tyr Ile Thr Glu Glu Asp Glu Ala Pro Thr Ser  
 165 170 175  
 Asn Ile Gly Ser Met Leu His Asp Ala Asn Lys Ala Asp Asp Asn Phe  
 180 185 190  
 Glu Ala Ala Leu Thr Glu Asp Asp Ser Thr Asp Asp Ala Glu Asp Glu  
 195 200 205  
 Gly Asp Asn Glu Glu Ile Pro Val Asp Asn Thr Leu Asp Val Glu Glu  
 210 215 220  
 Ala Ala Glu Arg Phe Ala Glu Leu Lys Ala Ala Tyr Asp Ala Val Ile  
 225 230 235 240  
 Gln Val Gln Glu Lys His Gly Ile His His Lys Lys Thr Gln Gln Arg  
 245 250 255  
 Cys Glu Glu Leu Ser Lys Val Leu Met Thr Phe Arg Leu Lys Pro Asn  
 260 265 270  
 Met Ile Asp Lys Ile Thr Asn Tyr Leu His Asp Leu Leu Ser Gln Val  
 275 280 285  
 Arg Lys His Glu Arg His Ile Met Ala Leu Cys Ile Asn Gln Ala Lys  
 290 295 300  
 Met Pro Arg Lys Leu Phe Ile Asp Ile Phe Pro Gly Asn Glu Thr Asn  
 305 310 315 320  
 Leu Asp Trp Ile Glu Tyr Gln Ile Lys Ala Glu Gln Ser Tyr Ser Glu  
 325 330 335  
 Ala Leu Gln Ser Leu Ala Pro Glu Val Thr Arg Ala Gln Lys Lys Leu  
 340 345 350  
 Ile Ser Leu Glu Gln Glu Ser Asn Phe Asp Val Thr Ala Ile Lys Glu  
 355 360 365  
 Val Asn Arg Asn Ile Ser Ile Gly Glu Ala Lys Ala His Arg Ala Lys

370

375

Lys Glu Met Val Glu Ala Asn Leu Arg Leu Val Ile Ser Ile Ala Lys  
385 390 395 400

Lys Tyr Thr Asn Arg Gly Leu Gln Phe Leu Asp Leu Ile Gln Glu Gly  
405 410 415

Asn Ile Gly Leu Met Lys Ala Val Asp Lys Phe Glu Tyr Arg Arg Gly  
420 425 430

Tyr Lys Phe Ser Thr Tyr Ala Thr Trp Trp Ile Arg Gln Ala Ile Thr  
435 440 445

Arg Ser Ile Ala Asp Gln Ala Arg Thr Ile Arg Ile Pro Val His Met  
450 455 460

Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln Met Ile Gln  
465 470 475 480

Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu Arg Met Glu  
485 490 495

Met Pro Glu His Lys Ile Arg Lys Ile Leu Lys Ile Ala Lys Glu Pro  
500 505 510

Ile Ser Met Glu Thr Pro Ile Gly Asp Asp Glu Asp Ser His Leu Gly  
515 520 525

Asp Phe Ile Glu Asp Thr Thr Met Gln Leu Pro Val Asp Ser Thr Met  
530 535 540

Gly Asp Ala Leu Lys Gln Ala Thr Ser Asp Ile Leu Glu Asn Leu Thr  
545 550 555 560

Pro Arg Glu Ala Lys Val Leu Arg Met Arg Phe Gly Ile Asp Met Asn  
565 570 575

Thr Asp His Thr Leu Glu Glu Val Gly Lys Gln Phe Asp Val Thr Arg  
580 585 590

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595 600 605

Pro Thr Arg Ser Glu Ile Leu Lys Ser Phe Leu Asp Ser Glu Glu  
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&lt;400&gt; 16

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20 25 30

Pro Asp Asp Met Ser Ser Pro Glu Glu Val Glu Glu Ile Val Ala Met  
35 40 45

Ile Ser Asp Met Gly Ile Pro Val Tyr Glu Thr Ala Pro Asp Pro Asp  
50 55 60

Ser Leu Leu Met Asn Glu His Ala Ser Ser Ala Glu Asp Asp Ala Asp  
65 70 75 80

Asp Ala Val Ala Ala Leu Asp Ser Asp Ala Glu Phe Gly Arg Thr Thr  
85 90 95

Asp Pro Val Arg Met Tyr Met Arg Glu Met Gly Ser Val Glu Leu Leu  
100 105 110

Thr Arg Gln Gly Glu Ile Glu Leu Ala Lys Arg Ile Glu Glu Gly Val  
115 120 125

Lys Gln Ala Phe Glu Ala Ile Ala His Tyr Pro Gln Ser Thr Ala Ile  
130 135 140

Ile Leu Glu Glu Tyr Ala Arg Phe Glu Ala Glu Glu Ile Arg Leu Asp  
145 150 155 160

Asp Ile Ile Ser Gly Tyr Ile Thr Glu Glu Asp Glu Ala Pro Thr Ser  
165 170 175

Asn Ile Gly Ser Met Leu Asp Asp Ala Asn Lys Ala Asp Asp Asn Phe  
180 185 190

Glu Ala Ala Leu Thr Glu Asp Asp Ser Thr Asp Asp Gly Glu Gly Glu  
195 200 205

Asp Asp Asn Glu Glu Ile Pro Val Asp Asn Thr Leu Asp Val Glu Glu  
210 215 220

Ala Ala Glu Arg Phe Ala Glu Leu Lys Ala Ala Tyr Asp Ala Val Ile  
225 230 235 240

Gln Val Gln Glu Lys His Gly Ile His His Lys Lys Thr Gln Gln Arg  
245 250 255

Cys Glu Glu Leu Ser Lys Val Leu Met Thr Phe Arg Leu Lys Pro Asn  
260 265 270

## 3757454\_1.txt

Met Ile Asp Lys Ile Thr Asn Tyr Leu His Gly Leu Leu Ser Gln Val  
 275 280 285  
 Arg Lys His Glu Arg His Ile Met Ala Leu Cys Ile Asn Gln Ala Lys  
 290 295 300  
 Met Pro Arg Lys Leu Phe Ile Asp Ile Phe Pro Gly Asn Glu Thr Asn  
 305 310 315 320  
 Leu Glu Trp Ile Glu Tyr Gln Ile Lys Ala Glu Gln Ser Tyr Ser Glu  
 325 330 335  
 Ala Leu Gln Ser Leu Ala Pro Glu Val Thr Arg Ala Gln Lys Lys Leu  
 340 345 350  
 Ile Ser Leu Glu Gln Glu Ser Asn Phe Asp Val Thr Ala Ile Lys Glu  
 355 360 365  
 Val Asn Arg Asn Ile Ser Ile Gly Glu Ala Lys Ala His Arg Ala Lys  
 370 375 380  
 Lys Glu Met Val Glu Ala Asn Leu Arg Leu Val Ile Ser Ile Ala Lys  
 385 390 395 400  
 Lys Tyr Thr Asn Arg Gly Leu Gln Phe Leu Asp Leu Ile Gln Glu Gly  
 405 410 415  
 Asn Ile Gly Leu Met Lys Ala Val Asp Lys Phe Glu Tyr Arg Arg Gly  
 420 425 430  
 Tyr Lys Phe Ser Thr Tyr Ala Thr Trp Trp Ile Arg Gln Ala Ile Thr  
 435 440 445  
 Arg Ser Ile Ala Asp Gln Ala Arg Thr Ile Arg Ile Pro Val His Met  
 450 455 460  
 Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln Met Ile Gln  
 465 470 475 480  
 Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu Arg Met Glu  
 485 490 495  
 Met Pro Glu His Lys Ile Arg Lys Ile Leu Lys Ile Ala Lys Glu Pro  
 500 505 510  
 Ile Ser Met Glu Thr Pro Ile Gly Asp Asp Glu Asp Ser His Leu Gly  
 515 520 525  
 Asp Phe Ile Glu Asp Thr Thr Met Gln Leu Pro Val Asp Ser Thr Met  
 530 535 540

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Gly Asp Ala Leu Lys Gln Ala Thr Ser Asp Ile Leu Glu Asn Leu Thr  
545 550 555 560

Pro Arg Glu Ala Lys Val Leu Arg Met Arg Phe Gly Ile Asp Met Asn  
565 570 575

Thr Asp His Thr Leu Glu Glu Val Gly Lys Gln Phe Asp Val Thr Arg  
580 585 590

Glu Arg Ile Arg Gln Ile Glu Ala Lys Ala Leu Arg Lys Leu Arg His  
595 600 605

Pro Thr Arg Ser Glu Ile Leu Lys Ser Phe Leu Asp Ser Glu Glu  
610 615 620

<210> 17  
<211> 623  
<212> PRT  
<213> Piscirickettsia salmonis  
<400> 17

Met Asp Gln Gln Glu Lys Arg Ser Gln Phe Lys Glu Leu Ile Val Arg  
1 5 10 15

Gly Lys Gln Gln Gly Phe Leu Thr Phe Thr Glu Val Asn Asp His Leu  
20 25 30

Pro Asp Asp Met Ser Ser Pro Glu Glu Val Glu Glu Ile Val Ala Met  
35 40 45

Ile Ser Asp Met Gly Ile Pro Val Tyr Glu Thr Ala Pro Asp Pro Asp  
50 55 60

Ser Leu Leu Met Asn Glu His Ala Ser Ser Ala Glu Asp Asp Ala Asp  
65 70 75 80

Asp Ala Val Ala Ala Leu Asp Ser Asp Ala Glu Phe Gly Arg Thr Thr  
85 90 95

Asp Pro Val Arg Met Tyr Met Arg Glu Met Gly Ser Val Glu Leu Leu  
100 105 110

Thr Arg Gln Gly Glu Ile Glu Leu Ala Lys Arg Ile Glu Glu Gly Val  
115 120 125

Lys Gln Ala Phe Glu Ala Ile Ala His Tyr Pro Gln Ser Thr Ala Ile  
130 135 140

Ile Leu Glu Glu Tyr Ala Arg Phe Glu Ala Glu Glu Ile Arg Leu Asp  
145 150 155 160

## 3757454\_1.txt

Asp Ile Ile Ser Gly Tyr Ile Thr Glu Glu Asp Glu Ala Pro Thr Ser  
 165 170 175  
 Asn Ile Gly Ser Met Leu Asp Asp Ala Asn Lys Ala Asp Asp Asn Phe  
 180 185 190  
 Glu Ala Ala Leu Thr Glu Asp Asp Ser Thr Asp Asp Gly Glu Gly Glu  
 195 200 205  
 Asp Asp Asn Glu Glu Ile Pro Val Asp Asn Thr Leu Asp Val Glu Glu  
 210 215 220  
 Ala Ala Glu Arg Phe Ala Glu Leu Lys Ala Ala Tyr Asp Ala Val Ile  
 225 230 235 240  
 Gln Val Gln Glu Lys His Gly Ile His His Lys Lys Thr Gln Gln Arg  
 245 250 255  
 Cys Glu Glu Leu Ser Lys Val Leu Met Thr Phe Arg Leu Lys Pro Asn  
 260 265 270  
 Met Ile Asp Lys Ile Thr Asn Tyr Leu His Gly Leu Leu Ser Gln Val  
 275 280 285  
 Arg Lys His Glu Arg His Ile Met Ala Leu Cys Ile Asn Gln Ala Lys  
 290 295 300  
 Met Pro Arg Lys Leu Phe Ile Asp Ile Phe Pro Gly Asn Glu Thr Asn  
 305 310 315 320  
 Leu Glu Trp Ile Glu Tyr Gln Ile Lys Ala Glu Gln Ser Tyr Ser Glu  
 325 330 335  
 Ala Leu Gln Ser Leu Ala Pro Glu Val Thr Arg Ala Gln Lys Lys Leu  
 340 345 350  
 Ile Ser Leu Glu Gln Glu Ser Asn Phe Asp Val Thr Ala Ile Lys Glu  
 355 360 365  
 Val Asn Arg Asn Ile Ser Ile Gly Glu Ala Lys Ala His Arg Ala Lys  
 370 375 380  
 Lys Glu Met Val Glu Ala Asn Leu Arg Leu Val Ile Ser Ile Ala Lys  
 385 390 395 400  
 Lys Tyr Thr Asn Arg Gly Leu Gln Phe Leu Asp Leu Ile Gln Glu Gly  
 405 410 415  
 Asn Ile Gly Leu Met Lys Ala Val Asp Lys Phe Glu Tyr Arg Arg Gly  
 420 425 430



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Tyr Lys Phe Ser Thr Tyr Ala Thr Trp Trp Ile Arg Gln Ala Ile Thr  
435 440 445

Arg Ser Ile Ala Asp Gln Ala Arg Thr Ile Arg Ile Pro Val His Met  
450 455 460

Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln Met Ile Gln  
465 470 475 480

Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu Arg Met Glu  
485 490 495

Met Pro Glu His Lys Ile Arg Lys Ile Leu Lys Ile Ala Lys Glu Pro  
500 505 510

Ile Ser Met Glu Thr Pro Ile Gly Asp Asp Glu Asp Ser His Leu Gly  
515 520 525

Asp Phe Ile Glu Asp Thr Thr Met Gln Leu Pro Val Asp Ser Thr Met  
530 535 540

Gly Asp Ala Leu Lys Gln Ala Thr Ser Asp Ile Leu Glu Asn Leu Thr  
545 550 555 560

Pro Arg Glu Ala Lys Val Leu Arg Met Arg Phe Gly Ile Asp Met Asn  
565 570 575

Thr Asp His Thr Leu Glu Glu Val Gly Lys Gln Phe Asp Val Thr Arg  
580 585 590

Glu Arg Ile Arg Gln Ile Glu Ala Lys Ala Leu Arg Lys Leu Arg His  
595 600 605

Pro Thr Arg Ser Glu Ile Leu Lys Ser Phe Leu Asp Ser Glu Glu  
610 615 620

<210> 18  
<211> 43  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 18

Val His Met Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln  
1 5 10 15

Met Ile Gln Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu  
20 25 30

Arg Met Glu Met Pro Glu His Lys Ile Arg Lys  
35 40

<210> 19  
 <211> 43  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 19

Val His Met Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln  
 1 5 10 15

Met Ile Gln Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu  
 20 25 30

Arg Met Glu Met Pro Glu His Lys Ile Arg Lys  
 35 40

<210> 20  
 <211> 43  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 20

Val His Met Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln  
 1 5 10 15

Met Ile Gln Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu  
 20 25 30

Arg Met Glu Met Pro Glu His Lys Ile Arg Lys  
 35 40

<210> 21  
 <211> 43  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 21

Val His Met Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln  
 1 5 10 15

Met Ile Gln Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu  
 20 25 30

Arg Met Glu Met Pro Glu His Lys Ile Arg Lys  
 35 40

<210> 22  
 <211> 43  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 22

Val His Met Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln  
 1 5 10 15

Met Ile Gln Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu  
                   20                  25                  30

Arg Met Glu Met Pro Glu His Lys Ile Arg Lys  
           35                  40

<210> 23  
 <211> 43  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 23

Val His Met Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln  
 1                  5                  10                  15

Met Ile Gln Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu  
                   20                  25                  30

Arg Met Glu Met Pro Glu His Lys Ile Arg Lys  
           35                  40

<210> 24  
 <211> 43  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 24

Val His Met Ile Glu Thr Ile Asn Lys Leu Asn Arg Val Ser Arg Gln  
 1                  5                  10                  15

Met Ile Gln Glu Leu Gly Arg Glu Ala Thr Pro Glu Glu Leu Ser Glu  
                   20                  25                  30

Arg Met Glu Met Pro Glu His Lys Ile Arg Lys  
           35                  40

<210> 25  
 <211> 82  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 25

Met Lys Ile Asn His Gln Pro Gly Gly Ile Met Leu Ile Met Asn Asn  
 1                  5                  10                  15

His Gly Glu Val Met Thr Ser Tyr Ser His Met Met Ile Phe Phe Ser  
           20                  25                  30

Asn Tyr Gly Glu Lys Val Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp  
           35                  40                  45

Asn Lys Leu Leu Phe Ser Asn Arg Val Ser Arg Val Arg Tyr Arg Pro  
           50                  55                  60

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Cys Leu Ile Ile Asp Ala Lys Asp Ala Leu Ser Val Cys Ser Gly Val  
65 70 75 80

Phe His

<210> 26  
<211> 218  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 26

Met Lys Ile Asn His Gln Pro Gly Gly Ile Met Leu Ile Met Asn Asn  
1 5 10 15

His Gly Glu Val Met Thr Ser Tyr Ser His Met Met Ser Phe Phe Ser  
20 25 30

Asn Tyr Gly Glu Lys Val Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp  
35 40 45

Asn Lys Leu Leu Phe Ser Asn Arg Val Ser Arg Val Arg Tyr Arg Pro  
50 55 60

Cys Leu Ile Ile Asp Ala Lys Asp Ala Leu Ser Val Cys Ser Gly Val  
65 70 75 80

Phe His Gln Val Lys Asn Glu Phe Gly Val Val Val Ala Ser Ser Leu  
85 90 95

Asn Val Met Ile Tyr Asp Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile  
100 105 110

His Ile Leu Lys Ser Val Lys Lys His Pro Lys Leu Ser Leu Ile Glu  
115 120 125

Ser Lys Ile Leu Phe Leu Lys Val Val Met Lys Gly Ile Lys Cys Arg  
130 135 140

His Ile Glu Ser Leu Leu Lys Val Ser Gly Ser Thr Val Tyr Thr Tyr  
145 150 155 160

Cys Met Asn Ile Lys Ser Lys Ala Asn Ile Phe Ser Phe Lys Gly Gln  
165 170 175

Ser Val Ile Gln Glu Leu Glu Lys Ser Gln Phe Phe Ser Asp Ile Ser  
180 185 190

Ile Lys Ile Asn Ile Asp Phe Tyr Asn Ile Asn Asn Gly Val Asn Glu  
195 200 205

Lys Asn Val Cys Gln Val Tyr Ser Leu Ala  
 210 215

<210> 27  
 <211> 218  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 27

Met Lys Ile Asn His Gln Pro Gly Gly Ile Met Leu Ile Met Asn Asn  
 1 5 10 15

His Gly Glu Val Met Thr Ser Tyr Ser His Met Met Ser Phe Phe Ser  
 20 25 30

Asn Tyr Gly Glu Lys Val Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp  
 35 40 45

Asn Lys Leu Leu Phe Ser Asn Arg Val Ser Arg Val Arg Tyr Arg Pro  
 50 55 60

Cys Leu Ile Ile Asp Ala Lys Asp Ala Leu Ser Val Cys Ser Gly Val  
 65 70 75 80

Phe His Gln Val Lys Asn Glu Phe Gly Val Val Val Ala Ser Ser Leu  
 85 90 95

Asn Val Met Ile Tyr Asp Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile  
 100 105 110

His Ile Leu Lys Ser Val Lys Lys His Pro Lys Leu Ser Leu Ile Glu  
 115 120 125

Ser Lys Ile Leu Phe Leu Lys Val Val Met Lys Gly Ile Lys Cys Arg  
 130 135 140

His Ile Glu Ser Leu Leu Lys Val Ser Gly Ser Thr Val Tyr Thr Tyr  
 145 150 155 160

Cys Met Asn Ile Lys Ser Lys Ala Asn Ile Phe Ser Phe Lys Gly Gln  
 165 170 175

Ser Val Ile Gln Glu Leu Glu Lys Ser Gln Phe Phe Ser Asp Ile Ser  
 180 185 190

Ile Lys Ile Asn Ile Asp Phe Tyr Asn Ile Asn Asn Gly Val Asn Glu  
 195 200 205

Lys Asn Val Cys Gln Val Tyr Ser Leu Ala  
 210 215

<210> 28

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<211> 218
<212> PRT
<213> Piscirickettsia salmonis

<400> 28

Met Lys Ile Asn His Gln Pro Gly Gly Ile Met Leu Ile Met Asn Asn
1      5      10      15

His Gly Glu Val Met Thr Ser Tyr Ser His Met Met Ser Phe Phe Ser
20      25      30

Asn Tyr Gly Glu Lys Val Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp
35      40      45

Asn Lys Leu Leu Phe Ser Asn Arg Val Ser Glu Val Arg Tyr Arg Pro
50      55      60

Cys Leu Ile Ile Asp Ala Lys Asp Ala Phe Ser Val Cys Ser Gly Val
65      70      75      80

Phe His Gln Val Lys Asn Glu Phe Gly Val Val Val Ala Asn Ser Leu
85      90      95

Asn Val Met Ile Tyr Asp Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile
100     105     110

His Ile Leu Lys Ser Val Lys Lys His Pro Lys Leu Ser Leu Ile Glu
115     120     125

Ser Lys Ile Leu Phe Leu Lys Val Val Met Lys Gly Ile Lys Cys Arg
130     135     140

His Ile Glu Ser Leu Leu Lys Val Ser Gly Ser Thr Val Tyr Thr Tyr
145     150     155     160

Cys Met Asn Ile Lys Ser Lys Ala Asn Ile Phe Ser Phe Lys Gly Gln
165     170     175

Ser Val Ile Gln Glu Leu Glu Lys Ser Gln Phe Phe Ser Asp Ile Ala
180     185     190

Met Lys Ile Asn Ile Asp Phe Tyr Ser Ile Asn Asn Glu Ala Asn Glu
195     200     205

Lys Asn Val Cys Gln Val Tyr Ser Leu Ala
210     215

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<210> 29
<211> 218
<212> PRT
<213> Piscirickettsia salmonis

<400> 29

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Met Lys Ile Asn His Gln Pro Gly Gly Ile Met Leu Ile Met Asn Asn  
1 5 10 15

His Gly Glu Val Met Thr Ser Tyr Ser His Met Met Ile Phe Phe Ser  
20 25 30

Asn Tyr Gly Glu Lys Val Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp  
35 40 45

Asn Lys Leu Leu Phe Ser Asn Arg Val Ser Arg Val Arg Tyr Arg Pro  
50 55 60

Cys Leu Ile Ile Asp Ala Lys Asp Ala Leu Ser Val Cys Ser Gly Val  
65 70 75 80

Phe His Gln Val Lys Asn Glu Phe Gly Val Val Val Ala Ser Ser Leu  
85 90 95

Asn Val Met Ile Tyr Asp Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile  
100 105 110

His Ile Leu Lys Ser Val Lys Lys His Pro Lys Leu Ser Leu Ile Glu  
115 120 125

Ser Lys Ile Leu Phe Leu Lys Val Val Met Lys Gly Ile Lys Cys Arg  
130 135 140

His Ile Glu Ser Leu Leu Lys Val Ser Gly Ser Thr Val Tyr Thr Tyr  
145 150 155 160

Cys Met Asn Ile Lys Ser Lys Ala Asn Ile Phe Ser Phe Lys Gly Gln  
165 170 175

Ser Val Ile Gln Glu Leu Glu Lys Ser Gln Phe Phe Ser Asp Ile Ser  
180 185 190

Ile Lys Ile Asn Ile Asp Phe Tyr Asn Ile Asn Asn Gly Val Asn Glu  
195 200 205

Lys Asn Val Cys Gln Val Tyr Ser Leu Ala  
210 215

<210> 30

<211> 99

<212> PRT

<213> Piscirickettsia salmonis

<400> 30

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

3757454\_1.txt

Asn Arg Val Ser Arg Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Leu Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Ser Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

<210> 31  
<211> 99  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 31

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

Asn Arg Val Ser Arg Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Leu Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Ser Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

<210> 32  
<211> 99  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 32

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15



3757454\_1.txt

Asn Arg Val Ser Arg Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Leu Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Ser Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

<210> 33  
<211> 99  
<212> PRT  
<213> Piscirickettsia salmonis  
<400> 33

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

Asn Arg Val Ser Arg Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Leu Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Ser Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

<210> 34  
<211> 99  
<212> PRT  
<213> Piscirickettsia salmonis  
<400> 34

3757454\_1.txt

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

Asn Arg Val Ser Glu Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Phe Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Asn Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

<210> 35

<211> 99

<212> PRT

<213> Piscirickettsia salmonis

<400> 35

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

Asn Arg Val Ser Glu Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Phe Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Asn Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

<210> 36

<211> 99

<212> PRT

<213> Piscirickettsia salmonis

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&lt;400&gt; 36

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

Asn Arg Val Ser Glu Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Phe Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Asn Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

&lt;210&gt; 37

&lt;211&gt; 99

&lt;212&gt; PRT

<213> *Piscirickettsia salmonis*

&lt;400&gt; 37

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

Asn Arg Val Ser Glu Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Phe Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Asn Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

&lt;210&gt; 38

&lt;211&gt; 99

&lt;212&gt; PRT

&lt;213&gt; Piscirickettsia salmonis

&lt;400&gt; 38

Lys Ile Glu Asn Gln Arg Ile Leu Asn Asp Asn Lys Leu Leu Phe Ser  
1 5 10 15

Asn Arg Val Ser Glu Val Arg Tyr Arg Pro Cys Leu Ile Ile Asp Ala  
20 25 30

Lys Asp Ala Phe Ser Val Cys Ser Gly Val Phe His Gln Val Lys Asn  
35 40 45

Glu Phe Gly Val Val Val Ala Asn Ser Leu Asn Val Met Ile Tyr Asp  
50 55 60

Tyr Lys Ser Met Ser Asp Glu Asp Ile Ile His Ile Leu Lys Ser Val  
65 70 75 80

Lys Lys His Pro Lys Leu Ser Leu Ile Glu Ser Lys Ile Leu Phe Leu  
85 90 95

Lys Val Val

&lt;210&gt; 39

&lt;211&gt; 316

&lt;212&gt; PRT

&lt;213&gt; Piscirickettsia salmonis

&lt;400&gt; 39

Met Ile Ser Leu Trp Lys Thr Tyr Gln Ala Leu Lys Thr Lys Gly Ile  
1 5 10 15

Leu Gly Ile Asn Gln Arg Asn Ala Asp Phe Ile Ile Arg Tyr Asn Gln  
20 25 30

Arg Lys Tyr Tyr Pro Leu Val Asp Asp Lys Ile Met Thr Lys Thr Leu  
35 40 45

Ala Ile Lys Asp Gly Ile Ala Val Pro Lys Leu Tyr Ala Thr Leu Lys  
50 55 60

Thr Asp His Asp Thr His His Leu Glu Gln Ile Leu Ala Asn Arg Thr  
65 70 75 80

Asp Phe Val Ile Lys Pro Ala Arg Gly Ala Gly Gly Asp Gly Ile Leu  
85 90 95

Val Ile Thr Asn Arg His Gly Glu Arg Phe Arg Lys Val Ser Gly Ala  
100 105 110

Leu Leu His Leu Asp Asp Ile Arg His His Ile Ser Asn Ile Leu Ser

115

120

125

Gly Val Tyr Ser Leu Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr  
 130 135 140

Arg Val Gln Phe Asp Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val  
 145 150 155 160

Pro Asp Ile Arg Ile Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met  
 165 170 175

Val Arg Leu Pro Thr Arg Leu Pro Asp Gly Lys Ala Asn Leu His Gln  
 180 185 190

Gly Ala Ile Gly Val Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu  
 195 200 205

Gly Val Trp Met Asn Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr  
 210 215 220

Ala Val Pro Gly Leu Gln Ile Pro His Trp Asp His Phe Leu Asn Leu  
 225 230 235 240

Ala Ala Arg Cys Tyr Glu Leu Thr Gln Leu Gly Tyr Leu Gly Val Asp  
 245 250 255

Ile Ile Leu Asp Lys Asp Lys Gly Pro Leu Met Leu Glu Leu Asn Ala  
 260 265 270

Arg Pro Gly Leu Asn Ile Gln Ile Ala Asn Asn Ser Gly Leu Leu His  
 275 280 285

Arg Leu Arg Phe Ile Glu Gln Gln Asn Gln Gln Arg Thr Ala Asp Glu  
 290 295 300

Arg Ile Ala Phe Ile Lys His Gln Phe Ala Lys Ile  
 305 310 315

<210> 40

<211> 316

<212> PRT

<213> Piscirickettsia salmonis

<400> 40

Met Ile Ser Leu Trp Lys Thr Tyr Gln Ala Leu Lys Thr Lys Gly Ile  
 1 5 10 15

Leu Gly Ile Asn Gln Arg Asn Ala Asp Phe Ile Ile Arg Tyr Asn Gln  
 20 25 30

Arg Lys Tyr Tyr Pro Leu Val Asp Asp Lys Ile Met Thr Lys Thr Leu  
 35 40 45

## 3757454\_1.txt

Ala Ile Lys Asp Gly Ile Ala Val Pro Lys Leu Tyr Ala Thr Leu Lys  
 50 55 60  
 Thr Asp His Asp Thr His His Leu Glu Gln Ile Leu Ala Asn Arg Thr  
 65 70 75 80  
 Asp Phe Val Ile Lys Pro Ala Arg Gly Ala Gly Gly Asp Gly Ile Leu  
 85 90 95  
 Val Ile Thr Asn Arg His Gly Glu Arg Phe Arg Lys Val Ser Gly Ala  
 100 105 110  
 Leu Leu His Leu Asp Asp Ile Arg His His Ile Ser Asn Ile Leu Ser  
 115 120 125  
 Gly Val Tyr Ser Leu Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr  
 130 135 140  
 Arg Val Gln Phe Asp Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val  
 145 150 155 160  
 Pro Asp Ile Arg Ile Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met  
 165 170 175  
 Val Arg Leu Pro Thr Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln  
 180 185 190  
 Gly Ala Ile Gly Val Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu  
 195 200 205  
 Gly Val Trp Met Asn Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr  
 210 215 220  
 Ala Val Pro Gly Leu Gln Ile Pro His Trp Asp His Phe Leu Asn Leu  
 225 230 235 240  
 Ala Ala Arg Cys Tyr Glu Leu Thr Gln Leu Gly Tyr Leu Gly Val Asp  
 245 250 255  
 Ile Ile Leu Asp Lys Asp Lys Gly Pro Leu Met Leu Glu Leu Asn Ala  
 260 265 270  
 Arg Pro Gly Leu Asn Ile Gln Ile Ala Asn Asn Ser Gly Leu Leu His  
 275 280 285  
 Arg Leu Arg Phe Ile Glu Gln Gln Asn Gln Gln Arg Thr Ala Asp Glu  
 290 295 300  
 Arg Ile Ala Phe Ile Lys His Gln Phe Ala Lys Ile  
 305 310 315

<210> 41  
 <211> 316  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 41

Met Ile Ser Leu Trp Lys Thr Tyr Gln Ala Leu Lys Thr Lys Gly Ile  
 1 5 10 15

Leu Gly Ile Asn Gln Arg Asn Ala Asp Phe Ile Ile Arg Tyr Asn Gln  
 20 25 30

Arg Lys Tyr Tyr Pro Leu Val Asp Asp Lys Ile Met Thr Lys Thr Leu  
 35 40 45

Ala Ile Lys Asp Gly Ile Ala Val Pro Lys Leu Tyr Ala Thr Leu Lys  
 50 55 60

Thr Asp His Asp Thr His His Leu Glu Gln Ile Leu Ala Asn Arg Thr  
 65 70 75 80

Asp Phe Val Ile Lys Pro Ala Arg Gly Ala Gly Gly Asp Gly Ile Leu  
 85 90 95

Val Ile Thr Asn Arg His Gly Glu Arg Phe Arg Lys Val Ser Gly Ala  
 100 105 110

Leu Leu His Leu Asp Asp Ile Arg His His Ile Ser Asn Ile Leu Ser  
 115 120 125

Gly Val Tyr Ser Leu Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr  
 130 135 140

Arg Val Gln Phe Asp Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val  
 145 150 155 160

Pro Asp Ile Arg Ile Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met  
 165 170 175

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

Gly Ala Ile Gly Val Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu  
 195 200 205

Gly Val Trp Met Asn Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr  
 210 215 220

Ala Val Pro Gly Leu Gln Ile Pro His Trp Asp His Phe Leu Asn Leu  
 225 230 235 240

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Ala Ala Arg Cys Tyr Glu Leu Thr Gln Leu Gly Tyr Leu Gly Val Asp  
245 250 255

Ile Ile Leu Asp Lys Asp Lys Gly Pro Leu Met Leu Glu Leu Asn Ala  
260 265 270

Arg Pro Gly Leu Asn Ile Gln Ile Ala Asn Asn Ser Gly Leu Leu His  
275 280 285

Arg Leu Arg Phe Ile Glu Gln Gln Asn Gln Gln Arg Thr Ala Asp Glu  
290 295 300

Arg Ile Ala Phe Ile Lys His Gln Phe Ala Lys Ile  
305 310 315

<210> 42  
<211> 316  
<212> PRT  
<213> Piscirickettsia salmonis  
<400> 42

Met Ile Ser Leu Trp Lys Thr Tyr Gln Ala Leu Lys Thr Lys Gly Ile  
1 5 10 15

Leu Gly Ile Asn Gln Arg Asn Ala Asp Phe Ile Ile Arg Tyr Asn Gln  
20 25 30

Arg Lys Tyr Tyr Pro Leu Val Asp Asp Lys Ile Met Thr Lys Thr Leu  
35 40 45

Ala Ile Lys Asp Gly Ile Ala Val Pro Lys Leu Tyr Ala Thr Leu Lys  
50 55 60

Thr Asp His Asp Thr His His Leu Glu Gln Ile Leu Ala Asn Arg Thr  
65 70 75 80

Asp Phe Val Ile Lys Pro Ala Arg Gly Ala Gly Gly Asp Gly Ile Leu  
85 90 95

Val Ile Thr Asn Arg His Gly Glu Arg Phe Arg Lys Val Ser Gly Ala  
100 105 110

Leu Leu His Leu Asp Asp Ile Arg His His Ile Ser Asn Ile Leu Ser  
115 120 125

Gly Val Tyr Ser Leu Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr  
130 135 140

Arg Val Gln Phe Asp Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val  
145 150 155 160



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Pro Asp Ile Arg Ile Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met  
165 170 175

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

Gly Ala Ile Gly Val Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu  
195 200 205

Gly Val Trp Met Asn Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr  
210 215 220

Ala Val Pro Gly Leu Gln Ile Pro His Trp Asp His Phe Leu Asn Leu  
225 230 235 240

Ala Ala Arg Cys Tyr Glu Leu Thr Gln Leu Gly Tyr Leu Gly Val Asp  
245 250 255

Ile Ile Leu Asp Lys Asp Lys Gly Pro Leu Met Leu Glu Leu Asn Ala  
260 265 270

Arg Pro Gly Leu Asn Ile Gln Ile Ala Asn Asn Ser Gly Leu Leu His  
275 280 285

Arg Leu Arg Phe Ile Glu Gln Gln Asn Gln Gln Arg Thr Ala Asp Glu  
290 295 300

Arg Ile Ala Phe Ile Lys His Gln Phe Ala Lys Ile  
305 310 315

<210> 43  
<211> 316  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 43

Met Ile Ser Leu Trp Lys Thr Tyr Gln Ala Leu Lys Thr Lys Gly Ile  
1 5 10 15

Leu Gly Ile Asn Gln Arg Asn Ala Asp Phe Ile Ile Arg Tyr Asn Gln  
20 25 30

Arg Lys Tyr Tyr Pro Leu Val Asp Asp Lys Ile Met Thr Lys Thr Leu  
35 40 45

Ala Ile Lys Asp Gly Ile Ala Val Pro Lys Leu Tyr Ala Thr Leu Lys  
50 55 60

Thr Asp His Asp Thr His His Leu Glu Gln Ile Leu Ala Asn Arg Thr  
65 70 75 80

Asp Phe Val Ile Lys Pro Ala Arg Gly Ala Gly Gly Asp Gly Ile Leu  
Page 33

Val Ile Thr Asn Arg His Gly Glu Arg Phe Arg Lys Val Ser Gly Ala  
100 105 110

Leu Leu His Leu Asp Asp Ile Arg His His Ile Ser Asn Ile Leu Ser  
115 120 125

Gly Val Tyr Ser Leu Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr  
130 135 140

Arg Val Gln Phe Asp Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val  
145 150 155 160

Pro Asp Ile Arg Ile Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met  
165 170 175

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

Gly Ala Ile Gly Val Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu  
195 200 205

Gly Val Trp Met Asn Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr  
210 215 220

Ala Val Pro Gly Leu Gln Ile Pro His Trp Asp His Phe Leu Asn Leu  
225 230 235 240

Ala Ala Arg Cys Tyr Glu Leu Thr Gln Leu Gly Tyr Leu Gly Val Asp  
245 250 255

Ile Ile Leu Asp Lys Asp Lys Gly Pro Leu Met Leu Glu Leu Asn Ala  
260 265 270

Arg Pro Gly Leu Asn Ile Gln Ile Ala Asn Asn Ser Gly Leu Leu His  
275 280 285

Arg Leu Arg Phe Ile Glu Gln Gln Asn Gln Gln Arg Thr Ala Asp Glu  
290 295 300

Arg Ile Ala Phe Ile Lys His Gln Phe Ala Lys Ile  
305 310 315

<210> 44

<211> 134

<212> PRT

<213> Piscirickettsia salmonis

<400> 44

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
1 5 10 15

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Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
115 120 125

Glu Leu Thr Gln Leu Gly  
130

<210> 45  
<211> 134  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 45

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
100 105 110

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Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
115 120 125

Glu Leu Thr Gln Leu Gly  
130

<210> 46  
<211> 134  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 46

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
115 120 125

Glu Leu Thr Gln Leu Gly  
130

<210> 47  
<211> 134  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 47

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile

35

40

45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
 50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
 65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
 85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
 100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
 115 120 125

Glu Leu Thr Gln Leu Gly  
 130

<210> 48

<211> 134

<212> PRT

<213> Piscirickettsia salmonis

<400> 48

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
 1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
 20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
 35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
 50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
 65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
 85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
 100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
 115 120 125

Glu Leu Thr Gln Leu Gly  
 130

<210> 49  
 <211> 134  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 49

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
 1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
 20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
 35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
 50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
 65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
 85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
 100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
 115 120 125

Glu Leu Thr Gln Leu Gly  
 130

<210> 50  
 <211> 134  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 50

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
 1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
 20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
 35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
 50 55 60

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Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
115 120 125

Glu Leu Thr Gln Leu Gly  
130

<210> 51  
<211> 134  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 51

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
115 120 125

Glu Leu Thr Gln Leu Gly  
130

<210> 52  
<211> 134  
<212> PRT  
<213> Piscirickettsia salmonis

&lt;400&gt; 52

Asp Ile Arg His His Ile Ser Asn Ile Leu Ser Gly Val Tyr Ser Leu  
1 5 10 15

Gly Gly Gln Arg Asp Gln Ala Met Ile Glu Tyr Arg Val Gln Phe Asp  
20 25 30

Pro Leu Phe Lys Lys Ile Ser Tyr Gln Gly Val Pro Asp Ile Arg Ile  
35 40 45

Ile Val Leu Lys Gly Tyr Pro Ala Met Ala Met Val Arg Leu Pro Thr  
50 55 60

Arg Leu Ser Asp Gly Lys Ala Asn Leu His Gln Gly Ala Ile Gly Val  
65 70 75 80

Gly Ile Asp Leu Thr Thr Gly Ile Thr Leu Glu Gly Val Trp Met Asn  
85 90 95

Asp Pro Ile His Glu His Pro Asp Thr Gly Tyr Ala Val Pro Gly Leu  
100 105 110

Gln Ile Pro His Trp Asp His Phe Leu Asn Leu Ala Ala Arg Cys Tyr  
115 120 125

Glu Leu Thr Gln Leu Gly  
130

&lt;210&gt; 53

&lt;211&gt; 660

&lt;212&gt; PRT

<213> *Piscirickettsia salmonis*

&lt;400&gt; 53

Met Ile Lys Asn Ile Met Leu Trp Leu Val Ile Ala Leu Val Leu Val  
1 5 10 15

Thr Val Phe Ser Asn Leu Gly Pro Arg Gln Gln Ser Val Asn Arg Leu  
20 25 30

Asp Tyr Ser Thr Phe Val Lys Asp Ile Asn Asn Gly Gln Val Lys Ser  
35 40 45

Val Ile Ile Asp Gly Leu Asn Ile Lys Gly Gln Thr Ser Ser Gly Thr  
50 55 60

Pro Phe Ala Thr Tyr Ile Pro Trp Lys Asp Pro Phe Leu Met Asp Gln  
65 70 75 80

Met Leu Ala Lys Asn Val Thr Ile Ala Ala Lys Pro Pro Glu Gln Arg  
85 90 95



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Ser Trp Leu Leu Ser Ala Leu Ile Ser Trp Phe Pro Gly Ile Leu Leu  
 100 105 110  
 Ile Ala Ile Trp Ile Phe Phe Leu Arg Gln Met Gln Gly Gly Gly Gly  
 115 120 125  
 Gly Lys Gly Met Met Ser Phe Gly Ser Ser Lys Ala Arg Leu Leu Gly  
 130 135 140  
 Glu Asp Gln Ile Lys Val Asn Phe Ala Asp Val Ala Gly Cys Glu Glu  
 145 150 155 160  
 Ala Lys Glu Glu Val Lys Glu Leu Val Asp Phe Leu Arg Asp Pro Thr  
 165 170 175  
 Lys Phe Gln Lys Leu Gly Gly Lys Ile Pro Gln Gly Val Leu Ile Val  
 180 185 190  
 Gly Pro Pro Gly Thr Gly Lys Thr Leu Leu Ala Lys Ala Ile Ala Gly  
 195 200 205  
 Glu Ala Lys Val Pro Phe Phe Ser Ile Ser Gly Ser Asp Phe Val Glu  
 210 215 220  
 Met Phe Val Gly Val Gly Ala Ser Arg Val Arg Asp Met Phe Asp Gln  
 225 230 235 240  
 Ala Lys Lys Arg Ala Pro Cys Ile Ile Phe Ile Asp Glu Ile Asp Ala  
 245 250 255  
 Val Gly Arg His Arg Gly Ser Gly Met Gly Gly Gly His Asp Glu Arg  
 260 265 270  
 Glu Gln Thr Leu Asn Gln Met Leu Val Glu Met Asp Gly Phe Glu Gly  
 275 280 285  
 Thr Glu Gly Val Ile Val Ile Ala Ala Thr Asn Arg Pro Asp Val Leu  
 290 295 300  
 Asp Pro Ala Leu Leu Arg Pro Gly Arg Phe Asp Arg Gln Val Ser Val  
 305 310 315 320  
 Gly Leu Pro Asp Val Lys Gly Arg Glu Gln Ile Leu Lys Val His Met  
 325 330 335  
 Arg Lys Val Pro Leu Gly Asp Asp Val Lys Ala Ser Leu Ile Ala Arg  
 340 345 350  
 Gly Thr Pro Gly Phe Ser Gly Ala Asp Leu Ala Asn Leu Val Asn Glu  
 355 360 365

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Ala Ala Leu Phe Ala Ala Arg Lys Asp Lys Thr Val Val Ala Met Arg  
 370 375 380  
 Glu Phe Asp Asp Ala Lys Asp Lys Ile Leu Met Gly Thr Glu Arg Arg  
 385 390 395 400  
 Ser Met Ala Met Thr Glu Glu Gln Lys Arg Leu Thr Ala Phe His Glu  
 405 410 415  
 Ala Gly His Ala Ile Val Gly Cys Leu Val Pro Asp His Asp Pro Val  
 420 425 430  
 Tyr Lys Val Ser Ile Val Pro Arg Gly Arg Ala Leu Gly Val Thr Met  
 435 440 445  
 Tyr Leu Pro Glu Glu Asp Ser Tyr Gly Tyr Ser Arg Glu Arg Leu Glu  
 450 455 460  
 Ser Leu Ile Ser Ser Met Tyr Gly Gly Arg Ile Ala Glu Ala Leu Val  
 465 470 475 480  
 Phe Gly Val Glu Lys Val Thr Thr Gly Ala Ser Asn Asp Ile Glu Lys  
 485 490 495  
 Ala Ser Glu Val Ala Arg Asn Met Val Thr Lys Trp Gly Leu Ser Glu  
 500 505  
 Arg Leu Gly Pro Ile Leu Tyr Gly Gln Glu Gly Gly Asp Pro Phe Gly  
 515 520 525  
 Tyr Gly Ala Gly Lys Gly Thr Pro Glu Phe Ser Asp Gln Thr Ser Val  
 530 535 540  
 Ala Ile Asp Glu Glu Val Arg Gln Ile Ile Asp Arg Asn Tyr Thr Arg  
 545 550 555 560  
 Ala Glu Ser Ile Leu Ile Asn Asn Arg Asp Ile Leu Asp Ala Met Ala  
 565 570 575  
 Asp Ala Leu Met Val Tyr Glu Thr Ile Asp Arg Asp Gln Val Ala Asp  
 580 585 590  
 Leu Met Ala Arg Arg Pro Val Lys Ala Pro Lys Asp Trp Asp Gln Pro  
 595 600 605  
 Ser Asp Glu Ser Gly Ser Ser Ala Ser Gly Asp Glu Leu Gln Pro Leu  
 610 615 620  
 Asp Ala Asn Ile Asn Thr Asp Ile Asn Glu Thr Lys Ser Ala Asp Gln  
 625 630 635 640

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Glu Thr Asp Gln Gly Ala Pro Ser Pro Glu Ile Lys Gly Lys Pro Ala  
645 650 655

Asp Asp Pro Thr  
660

<210> 54  
<211> 660  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 54

Met Ile Lys Asn Ile Met Leu Trp Leu Val Ile Ala Leu Val Leu Val  
1 5 10 15

Thr Val Phe Ser Asn Leu Gly Pro Arg Gln Gln Ser Val Asn Arg Leu  
20 25 30

Asp Tyr Ser Thr Phe Val Lys Asp Ile Asn Asn Gly Gln Val Lys Ser  
35 40 45

Val Ile Ile Asp Gly Leu Asn Ile Lys Gly Gln Thr Ser Ser Gly Thr  
50 55 60

Pro Phe Ala Thr Tyr Ile Pro Trp Lys Asp Pro Phe Leu Met Asp Gln  
65 70 75 80

Met Leu Ala Lys Asn Val Thr Ile Ala Ala Lys Pro Pro Glu Gln Arg  
85 90 95

Ser Trp Leu Leu Ser Ala Leu Ile Ser Trp Phe Pro Gly Ile Leu Leu  
100 105 110

Ile Ala Ile Trp Ile Phe Phe Leu Arg Gln Met Gln Gly Gly Gly Gly  
115 120 125

Gly Lys Gly Met Met Ser Phe Gly Ser Ser Lys Ala Arg Leu Leu Gly  
130 135 140

Glu Asp Gln Ile Lys Val Asn Phe Ala Asp Val Ala Gly Cys Glu Glu  
145 150 155 160

Ala Lys Glu Glu Val Lys Glu Leu Val Asp Phe Leu Arg Asp Pro Thr  
165 170 175

Lys Phe Gln Lys Leu Gly Gly Lys Ile Pro Gln Gly Val Leu Met Val  
180 185 190

Gly Pro Pro Gly Thr Gly Lys Thr Leu Leu Ala Lys Ala Ile Ala Gly  
195 200 205

## 3757454\_1.txt

Glu Ala Lys Val Pro Phe Phe Ser Ile Ser Gly Ser Asp Phe Val Glu  
 210 215 220  
 Met Phe Val Gly Val Gly Ala Ser Arg Val Arg Asp Met Phe Asp Gln  
 225 230 235 240  
 Ala Lys Lys Arg Ala Pro Cys Ile Ile Phe Ile Asp Glu Ile Asp Ala  
 245 250 255  
 Val Gly Arg His Arg Gly Ser Gly Met Gly Gly Gly His Asp Glu Arg  
 260 265 270  
 Glu Gln Thr Leu Asn Gln Met Leu Val Glu Met Asp Gly Phe Glu Gly  
 275 280 285  
 Thr Glu Gly Val Ile Val Ile Ala Ala Thr Asn Arg Pro Asp Val Leu  
 290 295 300  
 Asp Pro Ala Leu Leu Arg Pro Gly Arg Phe Asp Arg Gln Val Ser Val  
 305 310 315 320  
 Gly Leu Pro Asp Val Lys Gly Arg Glu Gln Ile Leu Lys Val His Met  
 325 330 335  
 Arg Lys Val Pro Leu Gly Asp Asp Val Lys Ala Ser Leu Ile Ala Arg  
 340 345 350  
 Gly Thr Pro Gly Phe Ser Gly Ala Asp Leu Ala Asn Leu Val Asn Glu  
 355 360 365  
 Ala Ala Leu Phe Ala Ala Arg Lys Asp Lys Thr Val Val Ala Met Arg  
 370 375 380  
 Glu Phe Asp Asp Ala Lys Asp Lys Ile Leu Met Gly Thr Glu Arg Arg  
 385 390 395 400  
 Ser Met Ala Met Thr Glu Glu Gln Lys Arg Leu Thr Ala Phe His Glu  
 405 410 415  
 Ala Gly His Ala Ile Val Gly Cys Leu Val Pro Asp His Asp Pro Val  
 420 425 430  
 Tyr Lys Val Ser Ile Val Pro Arg Gly Arg Ala Leu Gly Val Thr Met  
 435 440 445  
 Tyr Leu Pro Glu Glu Asp Ser Tyr Gly Tyr Ser Arg Glu Arg Leu Glu  
 450 455 460  
 Ser Leu Ile Ser Ser Met Tyr Gly Gly Arg Ile Ala Glu Ala Leu Val  
 465 470 475 480

Phe Gly Val Glu Lys Val Thr Thr Gly Ala Ser Asn Asp Ile Glu Lys  
485 490 495

Ala Ser Glu Val Ala Arg Asn Met Val Thr Lys Trp Gly Leu Ser Glu  
500 505 510

Arg Leu Gly Pro Ile Leu Tyr Gly Gln Glu Gly Gly Asp Pro Phe Gly  
515 520 525

Tyr Gly Ala Gly Lys Gly Thr Pro Glu Phe Ser Asp Gln Thr Ser Val  
530 535 540

Ala Ile Asp Glu Glu Val Arg Gln Ile Ile Asp Arg Asn Tyr Thr Arg  
545 550 555 560

Ala Glu Ser Ile Leu Ile Asn Asn Arg Asp Ile Leu Asp Ala Met Ala  
565 570 575

Asp Ala Leu Met Val Tyr Glu Thr Ile Asp Arg Asp Gln Val Ala Asp  
580 585 590

Leu Met Ala Arg Arg Pro Val Lys Ala Pro Lys Asp Trp Asp Gln Pro  
595 600 605

Ser Asp Glu Ser Gly Ser Ser Ala Ser Gly Asp Glu Leu Gln Pro Leu  
610 615 620

Asp Ala Asn Ile Asn Thr Asp Ile Asn Glu Thr Lys Ser Ala Asp Gln  
625 630 635 640

Glu Thr Asp Gln Gly Ala Pro Ser Pro Glu Ile Lys Gly Lys Pro Ala  
645 650 655

Asp Asp Pro Thr  
660

<210> 55

<211> 660

<212> PRT

<213> Piscirickettsia salmonis

<400> 55

Met Ile Lys Asn Ile Met Leu Trp Leu Val Ile Ala Leu Val Leu Val  
1 5 10 15

Thr Val Phe Ser Asn Leu Gly Pro Arg Gln Gln Ser Val Asn Arg Leu  
20 25 30

Asp Tyr Ser Thr Phe Val Lys Asp Ile Asn Asn Gly Gln Val Lys Ser  
35 40 45

Val Ile Ile Asp Gly Leu Asn Ile Lys Gly Gln Thr Ser Ser Gly Thr  
Page 45

50

55

60

Pro Phe Ala Thr Tyr Ile Pro Trp Lys Asp Pro Phe Leu Met Asp Gln  
65 70 75 80

Met Leu Ala Lys Asn Val Thr Ile Ala Ala Lys Pro Pro Glu Gln Arg  
85 90 95

Ser Trp Leu Leu Ser Ala Leu Ile Ser Trp Phe Pro Gly Ile Leu Leu  
100 105 110

Ile Ala Ile Trp Ile Phe Phe Leu Arg Gln Met Gln Gly Gly Gly Gly  
115 120 125

Gly Lys Gly Met Met Ser Phe Gly Ser Ser Lys Ala Arg Leu Leu Gly  
130 135 140

Glu Asp Gln Ile Lys Val Asn Phe Ala Asp Val Ala Gly Cys Glu Glu  
145 150 155 160

Ala Lys Glu Glu Val Lys Glu Leu Val Asp Phe Leu Arg Asp Pro Thr  
165 170 175

Lys Phe Gln Lys Leu Gly Gly Lys Ile Pro Gln Gly Val Leu Met Val  
180 185 190

Gly Pro Pro Gly Thr Gly Lys Thr Leu Leu Ala Lys Ala Ile Ala Gly  
195 200 205

Glu Ala Lys Val Pro Phe Phe Ser Ile Ser Gly Ser Asp Phe Val Glu  
210 215 220

Met Phe Val Gly Val Gly Ala Ser Arg Val Arg Asp Met Phe Asp Gln  
225 230 235 240

Ala Lys Lys Arg Ala Pro Cys Ile Ile Phe Ile Asp Glu Ile Asp Ala  
245 250 255

Val Gly Arg His Arg Gly Ser Gly Met Gly Gly Gly His Asp Glu Arg  
260 265 270

Glu Gln Thr Leu Asn Gln Met Leu Val Glu Met Asp Gly Phe Glu Gly  
275 280 285

Thr Glu Gly Val Ile Val Ile Ala Ala Thr Asn Arg Pro Asp Val Leu  
290 295 300

Asp Pro Ala Leu Leu Arg Pro Gly Arg Phe Asp Arg Gln Val Ser Val  
305 310 315 320

Gly Leu Pro Asp Val Lys Gly Arg Glu Gln Ile Leu Lys Val His Met

Arg Lys Val Pro Leu Gly Asp Asp Val Lys Ala Ser Leu Ile Ala Arg  
340 345 350

Gly Thr Pro Gly Phe Ser Gly Ala Asp Leu Ala Asn Leu Val Asn Glu  
355 360 365

Ala Ala Leu Phe Ala Ala Arg Lys Asp Lys Thr Val Val Ala Met Arg  
370 375 380

Glu Phe Asp Asp Ala Lys Asp Lys Ile Leu Met Gly Thr Glu Arg Arg  
385 390 395 400

Ser Met Ala Met Thr Glu Glu Gln Lys Arg Leu Thr Ala Phe His Glu  
405 410 415

Ala Gly His Ala Ile Val Gly Cys Leu Val Pro Asp His Asp Pro Val  
420 425 430

Tyr Lys Val Ser Ile Val Pro Arg Gly Arg Ala Leu Gly Val Thr Met  
435 440 445

Tyr Leu Pro Glu Glu Asp Ser Tyr Gly Tyr Ser Arg Glu Arg Leu Glu  
450 455 460

Ser Leu Ile Ser Ser Met Tyr Gly Gly Arg Ile Ala Glu Ala Leu Val  
465 470 475 480

Phe Gly Val Glu Lys Val Thr Thr Gly Ala Ser Asn Asp Ile Glu Lys  
485 490 495

Ala Ser Glu Val Ala Arg Asn Met Val Thr Lys Trp Gly Leu Ser Glu  
500 505 510

Arg Leu Gly Pro Ile Leu Tyr Gly Gln Glu Gly Gly Asp Pro Phe Gly  
515 520 525

Tyr Gly Ala Gly Lys Gly Thr Pro Glu Phe Ser Asp Gln Thr Ser Val  
530 535 540

Ala Ile Asp Glu Glu Val Arg Gln Ile Ile Asp Arg Asn Tyr Thr Arg  
545 550 555 560

Ala Glu Ser Ile Leu Ile Asn Asn Arg Asp Ile Leu Asp Ala Met Ala  
565 570 575

Asp Ala Leu Met Val Tyr Glu Thr Ile Asp Arg Asp Gln Val Ala Asp  
580 585 590

Leu Met Ala Arg Arg Pro Val Lys Ala Pro Lys Asp Trp Asp Gln Pro

595

600

605

Ser Asp Glu Ser Gly Ser Ser Ala Ser Gly Asp Glu Leu Gln Pro Leu  
 610 615 620

Asp Ala Asn Ile Asn Thr Asp Ile Asn Glu Thr Lys Ser Ala Asp Gln  
 625 630 635 640

Glu Thr Asp Gln Gly Ala Pro Ser Pro Glu Ile Lys Gly Lys Pro Ala  
 645 650 655

Asp Asp Pro Thr  
 660

<210> 56

<211> 660

<212> PRT

<213> Piscirickettsia salmonis

<400> 56

Met Ile Lys Asn Ile Met Leu Trp Leu Val Ile Ala Leu Val Leu Val  
 1 5 10 15

Thr Val Phe Ser Asn Leu Gly Pro Arg Gln Gln Ser Val Asn Arg Leu  
 20 25 30

Asp Tyr Ser Thr Phe Val Lys Asp Ile Asn Asn Gly Gln Val Lys Ser  
 35 40 45

Val Ile Ile Asp Gly Leu Asn Ile Lys Gly Gln Thr Ser Ser Gly Thr  
 50 55 60

Pro Phe Ala Thr Tyr Ile Pro Trp Lys Asp Pro Phe Leu Met Asp Gln  
 65 70 75 80

Met Leu Ser Lys Asn Val Thr Ile Ala Ala Lys Pro Pro Glu Gln Arg  
 85 90 95

Ser Trp Leu Leu Ser Ala Leu Ile Ser Trp Phe Pro Gly Ile Leu Leu  
 100 105 110

Ile Ala Ile Trp Ile Phe Phe Leu Arg Gln Met Gln Gly Gly Gly Gly  
 115 120 125

Gly Lys Gly Met Met Ser Phe Gly Ser Ser Lys Ala Arg Leu Leu Gly  
 130 135 140

Glu Asp Gln Ile Lys Val Asn Phe Ala Asp Val Ala Gly Cys Glu Glu  
 145 150 155 160

Ala Lys Glu Glu Val Lys Glu Leu Val Asp Phe Leu Arg Asp Pro Thr  
 165 170 175



## 3757454\_1.txt

Lys Phe Gln Lys<sub>180</sub> Leu Gly Gly Lys Ile<sub>185</sub> Pro Gln Gly Val Leu<sub>190</sub> Met Val  
 Gly Pro Pro<sub>195</sub> Gly Thr Gly Lys Thr<sub>200</sub> Leu Leu Ala Lys Ala<sub>205</sub> Ile Ala Gly  
 Glu Ala<sub>210</sub> Lys Val Pro Phe Phe<sub>215</sub> Ser Ile Ser Gly Ser<sub>220</sub> Asp Phe Val Glu  
 Met<sub>225</sub> Phe Val Gly Val Gly<sub>230</sub> Ala Ser Arg Val Arg<sub>235</sub> Asp Met Phe Asp Gln<sub>240</sub>  
 Ala Lys Lys Arg Ala<sub>245</sub> Pro Cys Ile Ile Phe<sub>250</sub> Ile Asp Glu Ile Asp<sub>255</sub> Ala  
 Val Gly Arg His<sub>260</sub> Arg Gly Ser Gly Met<sub>265</sub> Gly Gly Gly His Asp<sub>270</sub> Glu Arg  
 Glu Gln Thr<sub>275</sub> Leu Asn Gln Met Leu<sub>280</sub> Val Glu Met Asp Gly<sub>285</sub> Phe Glu Gly  
 Thr Glu<sub>290</sub> Gly Val Ile Val Ile<sub>295</sub> Ala Ala Thr Asn Arg<sub>300</sub> Pro Asp Val Leu  
 Asp<sub>305</sub> Pro Ala Leu Leu Arg<sub>310</sub> Pro Gly Arg Phe Asp<sub>315</sub> Arg Gln Val Ser Val<sub>320</sub>  
 Gly Leu Pro Asp Val<sub>325</sub> Lys Gly Arg Glu Gln<sub>330</sub> Ile Leu Lys Val His<sub>335</sub> Met  
 Arg Lys Val Pro<sub>340</sub> Leu Gly Asp Asp Val<sub>345</sub> Lys Ala Ser Leu Ile<sub>350</sub> Ala Arg  
 Gly Thr Pro<sub>355</sub> Gly Phe Ser Gly Ala<sub>360</sub> Asp Leu Ala Asn Leu<sub>365</sub> Val Asn Glu  
 Ala Ala<sub>370</sub> Leu Phe Ala Ala Arg<sub>375</sub> Lys Asp Lys Thr Val<sub>380</sub> Val Ala Met Arg  
 Glu<sub>385</sub> Phe Asp Asp Ala Lys<sub>390</sub> Asp Lys Ile Leu Met<sub>395</sub> Gly Thr Glu Arg Arg<sub>400</sub>  
 Ser Met Ala Met Thr<sub>405</sub> Glu Glu Gln Lys Arg<sub>410</sub> Leu Thr Ala Phe His<sub>415</sub> Glu  
 Ala Gly His Ala<sub>420</sub> Ile Val Gly Cys Leu<sub>425</sub> Val Pro Asp His Asp<sub>430</sub> Pro Val  
 Tyr Lys Val<sub>435</sub> Ser Ile Val Pro Arg<sub>440</sub> Gly Arg Ala Leu Gly<sub>445</sub> Val Thr Met

3757454\_1.txt

Tyr Leu Pro Glu Glu Asp Ser Tyr Gly Tyr Ser Arg Glu Arg Leu Glu  
450 455 460

Ser Leu Ile Ser Ser Met Tyr Gly Gly Arg Ile Ala Glu Ala Leu Val  
465 470 475 480

Phe Gly Val Glu Lys Val Thr Thr Gly Ala Ser Asn Asp Ile Glu Lys  
485 490 495

Ala Ser Glu Val Ala Arg Asn Met Val Thr Lys Trp Gly Leu Ser Glu  
500 505 510

Arg Leu Gly Pro Ile Leu Tyr Gly Gln Glu Gly Gly Asp Pro Phe Gly  
515 520 525

Tyr Gly Ala Gly Lys Gly Thr Pro Glu Phe Ser Asp Gln Thr Ser Val  
530 535 540

Ala Ile Asp Glu Glu Val Arg Gln Ile Ile Asp Arg Asn Tyr Thr Arg  
545 550 555 560

Ala Glu Ser Ile Leu Ile Asp Asn Arg Asp Ile Leu Asp Ala Met Ala  
565 570 575

Asp Ala Leu Met Val Tyr Glu Thr Ile Asp Arg Glu Gln Val Ala Asp  
580 585 590

Leu Met Ala Arg Arg Pro Val Lys Ala Pro Lys Asp Trp Asp Gln Pro  
595 600 605

Ser Asp Glu Ser Gly Ser Ser Ala Ser Gly Asp Glu Leu Gln Pro Leu  
610 615 620

Asp Ala Asn Ile Asn Thr Asp Ile Asn Asp Thr Lys Ser Ala Asp Gln  
625 630 635 640

Glu Ile Asp Gln Gly Ala Pro Ser Pro Glu Ile Lys Gly Lys Pro Ala  
645 650 655

Asp Asp Pro Thr  
660

<210> 57  
<211> 660  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 57

Met Ile Lys Asn Ile Met Leu Trp Leu Val Ile Ala Leu Val Leu Val  
1 5 10 15

## 3757454\_1.txt

Thr Val Phe Ser<sub>20</sub> Asn Leu Gly Pro Arg<sub>25</sub> Gln Gln Ser Val Asn<sub>30</sub> Arg Leu  
 Asp Tyr Ser<sub>35</sub> Thr Phe Val Lys Asp<sub>40</sub> Ile Asn Asn Gly Gln<sub>45</sub> Val Lys Ser  
 Val Ile<sub>50</sub> Ile Asp Gly Leu Asn<sub>55</sub> Ile Lys Gly Gln Thr<sub>60</sub> Ser Ser Gly Thr  
 Pro Phe Ala Thr Tyr Ile<sub>70</sub> Pro Trp Lys Asp Pro<sub>75</sub> Phe Leu Met Asp Gln<sub>80</sub>  
 Met Leu Ala Lys Asn<sub>85</sub> Val Thr Ile Ala Ala<sub>90</sub> Lys Pro Pro Glu Gln<sub>95</sub> Arg  
 Ser Trp Leu Leu<sub>100</sub> Ser Ala Leu Ile Ser<sub>105</sub> Trp Phe Pro Gly Ile<sub>110</sub> Leu Leu  
 Ile Ala Ile<sub>115</sub> Trp Ile Phe Phe Leu<sub>120</sub> Arg Gln Met Gln Gly<sub>125</sub> Gly Gly Gly  
 Gly Lys<sub>130</sub> Gly Met Met Ser Phe<sub>135</sub> Gly Ser Ser Lys Ala<sub>140</sub> Arg Leu Leu Gly  
 Glu Asp Gln Ile Lys Val<sub>150</sub> Asn Phe Ala Asp Val<sub>155</sub> Ala Gly Cys Glu Glu<sub>160</sub>  
 Ala Lys Glu Glu Val<sub>165</sub> Lys Glu Leu Val Asp<sub>170</sub> Phe Leu Arg Asp Pro<sub>175</sub> Thr  
 Lys Phe Gln Lys<sub>180</sub> Leu Gly Gly Lys Ile<sub>185</sub> Pro Gln Gly Val Leu<sub>190</sub> Met Val  
 Gly Pro Pro<sub>195</sub> Gly Thr Gly Lys Thr<sub>200</sub> Leu Leu Ala Lys Ala<sub>205</sub> Ile Ala Gly  
 Glu Ala<sub>210</sub> Lys Val Pro Phe Phe<sub>215</sub> Ser Ile Ser Gly Ser<sub>220</sub> Asp Phe Val Glu  
 Met Phe Val Gly Val<sub>230</sub> Gly Ala Ser Arg Val Arg<sub>235</sub> Asp Met Phe Asp Gln<sub>240</sub>  
 Ala Lys Lys Arg Ala<sub>245</sub> Pro Cys Ile Ile Phe<sub>250</sub> Ile Asp Glu Ile Asp<sub>255</sub> Ala  
 Val Gly Arg His<sub>260</sub> Arg Gly Ser Gly Met<sub>265</sub> Gly Gly Gly His Asp<sub>270</sub> Glu Arg  
 Glu Gln Thr<sub>275</sub> Leu Asn Gln Met Leu<sub>280</sub> Val Glu Met Asp Gly<sub>285</sub> Phe Glu Gly

## 3757454\_1.txt

Thr Glu Gly Val Ile Val Ile Ala Ala Thr Asn Arg Pro Asp Val Leu  
 290 295 300  
 Asp Pro Ala Leu Leu Arg Pro Gly Arg Phe Asp Arg Gln Val Ser Val  
 305 310 315 320  
 Gly Leu Pro Asp Val Lys Gly Arg Glu Gln Ile Leu Lys Val His Met  
 325 330 335  
 Arg Lys Val Pro Leu Gly Asp Asp Val Lys Ala Ser Leu Ile Ala Arg  
 340 345 350  
 Gly Thr Pro Gly Phe Ser Gly Ala Asp Leu Ala Asn Leu Val Asn Glu  
 355 360 365  
 Ala Ala Leu Phe Ala Ala Arg Lys Asp Lys Thr Val Val Ala Met Arg  
 370 375 380  
 Glu Phe Asp Asp Ala Lys Asp Lys Ile Leu Met Gly Thr Glu Arg Arg  
 385 390 395 400  
 Ser Met Ala Met Thr Glu Glu Gln Lys Arg Leu Thr Ala Phe His Glu  
 405 410 415  
 Ala Gly His Ala Ile Val Gly Cys Leu Val Pro Asp His Asp Pro Val  
 420 425 430  
 Tyr Lys Val Ser Ile Val Pro Arg Gly Arg Ala Leu Gly Val Thr Met  
 435 440 445  
 Tyr Leu Pro Glu Glu Asp Ser Tyr Gly Tyr Ser Arg Glu Arg Leu Glu  
 450 455 460  
 Ser Leu Ile Ser Ser Met Tyr Gly Gly Arg Ile Ala Glu Ala Leu Val  
 465 470 475 480  
 Phe Gly Val Glu Lys Val Thr Thr Gly Ala Ser Asn Asp Ile Glu Lys  
 485 490 495  
 Ala Ser Glu Val Ala Arg Asn Met Val Thr Lys Trp Gly Leu Ser Glu  
 500 505 510  
 Arg Leu Gly Pro Ile Leu Tyr Gly Gln Glu Gly Gly Asp Pro Phe Gly  
 515 520 525  
 Tyr Gly Ala Gly Lys Gly Thr Pro Glu Phe Ser Asp Gln Thr Ser Val  
 530 535 540  
 Ala Ile Asp Glu Glu Val Arg Gln Ile Ile Asp Arg Asn Tyr Thr Arg  
 545 550 555 560

3757454\_1.txt

Ala Glu Ser Ile Leu Ile Asn Asn Arg Asp Ile Leu Asp Ala Met Ala  
565 570 575

Asp Ala Leu Met Val Tyr Glu Thr Ile Asp Arg Asp Gln Val Ala Asp  
580 585 590

Leu Met Ala Arg Arg Pro Val Lys Ala Pro Lys Asp Trp Asp Gln Pro  
595 600 605

Ser Asp Glu Ser Gly Ser Ser Ala Ser Gly Asp Glu Leu Gln Pro Leu  
610 615 620

Asp Ala Asn Ile Asn Thr Asp Ile Asn Glu Thr Lys Ser Ala Asp Gln  
625 630 635 640

Glu Thr Asp Gln Gly Ala Pro Ser Pro Glu Ile Lys Gly Lys Pro Ala  
645 650 655

Asp Asp Pro Thr  
660

<210> 58  
<211> 123  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 58

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
115 120

## 3757454\_1.txt

<210> 59  
 <211> 123  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 59

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
 1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
 20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
 35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
 50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
 65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
 85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
 100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
 115 120

<210> 60  
 <211> 123  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 60

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
 1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
 20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
 35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
 50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
 65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
 85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
 100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
 115 120

<210> 61  
 <211> 123  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 61

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
 1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
 20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
 35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
 50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
 65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
 85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
 100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
 115 120

<210> 62  
 <211> 123  
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 <213> Piscirickettsia salmonis

<400> 62

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
 1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
 20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
 35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
115 120

<210> 63

<211> 123

<212> PRT

<213> Piscirickettsia salmonis

<400> 63

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
115 120

<210> 64

<211> 123

<212> PRT

<213> Piscirickettsia salmonis

<400> 64

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
1 5 10 15



3757454\_1.txt

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
115 120

<210> 65  
<211> 123  
<212> PRT  
<213> Piscirickettsia salmonis

<400> 65

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
115 120

3757454\_1.txt

<210> 66  
 <211> 123  
 <212> PRT  
 <213> Piscirickettsia salmonis

<400> 66

Phe Ala Asp Val Ala Gly Cys Glu Glu Ala Lys Glu Glu Val Lys Glu  
 1 5 10 15

Leu Val Asp Phe Leu Arg Asp Pro Thr Lys Phe Gln Lys Leu Gly Gly  
 20 25 30

Lys Ile Pro Gln Gly Val Leu Met Val Gly Pro Pro Gly Thr Gly Lys  
 35 40 45

Thr Leu Leu Ala Lys Ala Ile Ala Gly Glu Ala Lys Val Pro Phe Phe  
 50 55 60

Ser Ile Ser Gly Ser Asp Phe Val Glu Met Phe Val Gly Val Gly Ala  
 65 70 75 80

Ser Arg Val Arg Asp Met Phe Asp Gln Ala Lys Lys Arg Ala Pro Cys  
 85 90 95

Ile Ile Phe Ile Asp Glu Ile Asp Ala Val Gly Arg His Arg Gly Ser  
 100 105 110

Gly Met Gly Gly Gly His Asp Glu Arg Glu Gln  
 115 120

<210> 67  
 <211> 25  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> PCR Primer: rpoD SNP Detection Forward Primer

<400> 67  
 ggacaatccg gattcctgta catat

25

<210> 68  
 <211> 19  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> DNA probe: rpoD VProbe1-VIC Mutant Allele

<400> 68  
 acaagcttaa ctgcgtctc

19

<210> 69  
 <211> 17  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> DNA probe: rpoD MProbe2-FAM wild-Type Allele  
 <400> 69  
 aagcttaacc gcgtctc 17

<210> 70  
 <211> 23  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> PCR Primer: rpoD SNP Detection Reverse Primer  
 <400> 70  
 gccgagttct tggatcattt gac 23

<210> 71  
 <211> 18  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> PCR Primer: ATP-Grasp Domain Protein SNP Detection Forward Primer  
 <400> 71  
 tggcgatggg gcgtctac 18

<210> 72  
 <211> 16  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> DNA probe: ATP-Grasp Domain Protein VProbe1-VIC Mutant Allele  
 <400> 72  
 ccatcaggga gccgag 16

<210> 73  
 <211> 16  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> DNA probe: ATP-Grasp Domain Protein MProbe2-FAM wild-Type Allele  
 <400> 73  
 ccatcagaga gccgag 16

<210> 74  
 <211> 22  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> PCR Primer: ATP-Grasp Domain Protein SNP Detection Reverse Primer  
 <400> 74  
 cgccaattgc accttgatga ag 22

<210> 75  
 <211> 24  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> PCR Primer: FtsH SNP Detection Forward Primer  
  
 <400> 75  
 ccaaaagtta ggcggcaaaa ttcc 24

<210> 76  
 <211> 14  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> DNA probe: FtsH VProbe1-VIC Mutant Allele  
  
 <400> 76  
 tgggccaact atca 14

<210> 77  
 <211> 14  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> DNA probe: FtsH MProbe2-FAM wild-Type Allele  
  
 <400> 77  
 tgggccaacc atca 14

<210> 78  
 <211> 24  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> PCR Primer: FtsH SNP Detection Reverse Primer  
  
 <400> 78  
 gctaatagcg tcttacctgt tcca 24