

**Supplementary table 5**

<b>Primer</b>	<b>Sequence (5' to 3')</b>	<b>Product Name</b>	<b>Template</b>
For IreB expression in pET22b			
P1-F	ACTTTAAGAAGGAGATATACATATGGGATTTACCGAAGAAACCG	P1	WT
P1-R	GGTGGTGGTGCTCGAGGAGGTCAATCCCATTCCCTTT		
For STKcat expression in pET42a			
P2-F	GGATATCGGGGATCCATTCAAATCGGTAAGATCTTTG	P2	WT
P2-R	GGTGGTGGTGCTCGAGGCGTGTACGTATGCCTGGCC		
For STP expression in pET22b			
P3-F	ACTTTAAGAAGGAGATATACATATGGAAATTGCATTACTTACTG	P3	WT
P3-R	GGTGGTGGTGCTCGAGCCTAGCCTCCTCCGTAATG		
For introducing T4A mutation into P1			
P4-F	GAAAACGAACGGTTTCTTCGGCAAATCCCATATGTATATC	P4	P1
P4-R	GATATACATATGGGATTTGCCGAAGAAACCGTTCGTTTTTC		
For introducing T7A mutation into P1			
P5-F	CATCTAGGCGAAAACGAACGGCTTCTTCGGTAAATCCCAT	P5	P1
P5-R	ATGGGATTTACCGAAGAAGCCGTTTCGTTTTTCGCCTAGATG		
For introducing T4A and T7A mutations into P1			
P6-F	CTAGGCGAAAACGAACGGCTTCTTCGGCAAATCCCATATGTATAT	P6	P1
P6-R	ATATACATATGGGATTTGCCGAAGAAGCCGTTTCGTTTTTCGCCTAG		
For introducing T4E and T7E mutations into P1			
P7-F	CTAGGCGAAAACGAACTTCTTCTTCTTCAAATCCCATATGTATAT	P7	P1
P7-R	ATATACATATGGGATTTGAAGAAGAAGAAGTTTCGTTTTTCGCCTAG		
For IreB-GFP expression in pET22b			
P9-F	ACTTTAAGAAGGAGATATACATATGGGATTTACCGAAGAAACCG	P9	PIG
P9-R	GGTGGTGGTGCTCGAGCTTATAAAGCTCATCCATGCCG		
For introducing I73R and Y80E mutations into P1			
P10-F	CATGAACGAGATGAAATCCGTGAAGAATTGGTGCCTACGAACGTAAAGGGAATG	P10	P1
P10-R	CCATTCCCTTTACGTTCTAGCGCACCAATTCTTACGGATTTTCATCTCGTTCATG		
For MurA expression in pET22b			
P11-F	ACTTTAAGAAGGAGATATACATATGGATAACAATTATTATTACAGGTAG	P11	WT
P11-R	GGTGGTGGTGCTCGAGTCCATTTTCATCTTCTCCAC		

For MurZ expression in pET22b			
P12-F	ACTTTAAGAAGGAGATATACATATGAGAAAAATTGTAATTAATGGTG	P12	WT
P12-R	GGTGGTGGTGCTCGAGATCCTCAATCAATTGAATATC		
For introducing D280Y, then E259A and I265V, into P12			
P13-F	GTTCCGATGACCATTTCTGAATATAGTATTTTTGTTGAAAAG	P13	P12
P13-R	CTTTTCAACAAAAATACTATATTCAGAAATGGTCATGCGAAC		
P14-F	ATCGATAATGTCCTTTATGCACACTTAGAGAGTTACGTCGCTAAGTTGGAAGAAATC	P14	P13
P14-R	CATTTCTTCCAACCTTAGCGACGTAACCTCTCTAAGTGTGCATAAAGGACATTATCGAT		
For construction of P15 (pKT25::ireB)			
P15-F	GATCGGATCCCATGGGATTTACCGAAGAAAC	P15	WT
P15-R	GATCGGTACCCGGAGGTCAATCCCATTC		
For construction of P16 (pKNT25::ireB)			
P16-F	GATCGGATCCCATGGGATTTACCGAAGAAAC	P16	WT
P16-R	GATCGGTACCCGGAGGTCAATCCCATTC		
For construction of P17 (pUT18C::murA)			
P17-F	GATCCTGCAGGATGGATACAATTATTATTACAGGTAG	P17	WT
P17-R	GATCGGATCCTCTCCATTTTCATCTTCTCCACTC		
For construction of P18 (pUT18::murA)			
P18-F	GATCCTGCAGGATGGATACAATTATTATTACAGGTAG	P18	WT
P18-R	GATCGGATCCTCTCCATTTTCATCTTCTCCACTC		
For construction of P19 (pUT18C::murZ)			
P19-F	GATCGGATCCCATGAGAAAAATTGTAATTAATGGTGG	P19	WT
P19-R	GATCGGTACCCGATCCTCAATCAATTGAATATCTGC		
For construction of P20 (pUT18::murZ)			
P20-F	GATCGGATCCCATGAGAAAAATTGTAATTAATGGTGG	P20	WT
P20-R	GATCGGTACCCGATCCTCAATCAATTGAATATCTGC		
For construction of P21 (pUT18C::murZ(E259A/I265V/D280Y))			
P21-F	GATCGGATCCCATGAGAAAAATTGTAATTAATGGTGG	P21	WT
P21-R	GATCGGTACCCGATCCTCAATCAATTGAATATCTGC		
For construction of P22 (pUT18::murZ(E259A/I265V/D280Y))			
P22-F	GATCGGATCCCATGAGAAAAATTGTAATTAATGGTGG	P22	WT
P22-R	GATCGGTACCCGATCCTCAATCAATTGAATATCTGC		

For construction of <i>S. suis</i> mutant strains			
<i>ΔireB</i> strain			
IreB-up1-F	CTTGATGGCGGTATTGAA	<i>ΔireB</i> ::PPE	WT
IreB-up1-R	ACTTACACCTTCTTTCCCT		
IreB-PPE-F	AGGGAAAGAAGGTGTAAGTTGTTTCGCCAGAGGCTT		PPE <sup>6</sup>
IreB-PPE-R	ACGTCTAATCCCATTATTCTCACCAAATTCCCCGTAGGC		
IreB-dn1-F	TGAGAATAATGGGATTAGACGT		WT
IreB-dn1-R	TCTGCTGTTGCGTCTTCT		
IreB-up2-F	CTTGATGGCGGTATTGAA	<i>ΔireB</i>	WT
IreB-up2-R	ACTTACACCTTCTTTCCCT		
IreB-dn2-F	AGGGAAAGAAGGTGTAAGTTGAGAATAATGGGATTAGACGT		
IreB-dn2-R	TCTGCTGTTGCGTCTTCT		
<i>CΔireB</i> strain			
CIreB-up2-F	ACAACGCCTGGTGGACG	<i>CΔireB</i>	<i>ΔireB</i> ::P
CIreB-up2-R	ACTTACACCTTCTTTCCCT		
CIreB-dn2-F	AGGGAAAGAAGGTGTAAGTTGAGAATAATGGGATTAGACGT		
CIreB-dn2-R	TGATAGGCTGGATAGTTTTGATA		
<i>ΔmurZ</i> strain			
MurZ-up1-F	TGTTGCTCACCCAGTTTCAGTTC	<i>ΔmurZ</i> ::PPE	WT
MurZ-up1-R	ACTACAGAAAGCCTCTGGCGAAACAACATACTTCTTAATTTGC		
MurZ-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		PPE
MurZ-PPE-R	CCAAATTCCCCGTAGGCGCTAG		
MurZ-dn1-F	CTAGCGCCTACGGGGAATTTGGAGAGTCTAATTGAGAACTACTTTCT		WT
MurZ-dn1-R	ATACGATTGCCAACAACACTGCTT		
MurZ-up2-F	TGTTGCTCACCCAGTTTCAGTTC	<i>ΔmurZ</i>	WT
MurZ-up2-R	AGAAAGTAGTTCTCAATTAGACTCTACTAACATACTTCTTAATTTGC		
MurZ-dn2-F	GCAAATTAAGAAAGTGAATGTTAGTAGAGTCTAATTGAGAACTACTTTCT		
MurZ-dn2-R	ATACGATTGCCAACAACACTGCTT		
<i>ΔmurA</i> strain			
MurA-up1-F	AGCCTTCGCTCACTTGGATTCA	<i>ΔmurA</i> ::PPE	WT
MurA-up1-R	TTCTTATCCTTTTCTTACTTAAATC		
MurA-PPE-F	GATTTAAGTAAGAAAAGGATAAGAATGTTTCGCCAGAGGCTT		PPE

MurA-PPE-R	CCAAATTCCCCGTAGGC		PPE
MurA-dn1-F	GCCTACGGGGAATTTGGGGATAATCTTAGCTATGTTGGTA		
MurA-dn1-R	ATCCTCCTAAATGTTTTCTACG	$\Delta murA$	WT
MurA-up2-F	AGCCTTCGCTCACTTGGATTCA		
MurA-up2-R	ACCAACATAGCTAAGATTATCCTTCTTATCCTTTTCTTACTTAAAT		
MurA-dn2-F	ATTTAAGTAAGAAAAGGATAAGAAGGATAATCTTAGCTATGTTGGT		
MurA-dn2-R	ATCCTCCTAAATGTTTTCTACG		
$\Delta stp$ strain			
STP-up1-F	TATCCGTTCAGTATTCTGTGCCA	$\Delta stp :: PPE$	WT
STP-up1-R	ACTACAGAAAGCCTCTGGCGAAACAAATTTTTATCGTTGCTAAGCAA		
STP-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		
STP-PPE-R	CCAAATTCCCCGTAGGCGCTAG		
STP-dn1-F	CTAGCGCCTACGGGGAATTTGGATGATTCAAATCGGTAAGATCTT		
STP-dn1-R	CTTCGCCACTTCTTTCTTACCAG		
STP-up2-F	TATCCGTTCAGTATTCTGTGCCA	$\Delta stp$	WT
STP-up2-R	AAGATCTTACCGATTGAATCATAATTTTTATCGTTGCTAAGCAA		
STP-dn2-F	TTGCTTAGCAACGATAAAAATTATGATTCAAATCGGTAAGATCTT		
STP-dn2-R	CTTCGCCACTTCTTTCTTACCAG		
$\Delta stk$ strain			
STK-up1-F	ATCGATGGATTTTGATTCTCTAAAGA	$\Delta stk :: PPE$	WT
STK-up1-R	ACTACAGAAAGCCTCTGGCGAAACATTACCTAGCCTCCTCCGTAAT		
STK-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		
STK-PPE-R	CCAAATTCCCCGTAGGCGCTAG		
STK-dn1-F	CTAGCGCCTACGGGGAATTTGGAGATGAATAAGGTTGGGGAGAT		
STK-dn1-R	ACCTATCTTGAGAGTGGTCGTGG		
STK-up2-F	ATCGATGGATTTTGATTCTCTAAAGA	$\Delta stk$	WT
STK-up2-R	ATCTCCCCAACCTTATTCATCTTTACCTAGCCTCCTCCGTAAT		
STK-dn2-F	ATTACGGAGGAGGCTAGGTAAAGATGAATAAGGTTGGGGAGAT		
STK-dn2-R	ACCTATCTTGAGAGTGGTCGTGG		
$\Delta clpP$ strain			
ClpP-up1-F	CTGTGTATGCTTTCTTGAACGCC		WT

ClpP-up1-R	ACTACAGAAAGCCTCTGGCGAAACAGCAGTGACAAATATGTAATAGTA		W 1
ClpP-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT	$\Delta clpP$ ::PPE	PPE
ClpP-PPE-R	CCAAATTCCCGTAGGCGCTAG		
ClpP-dn1-F	CTAGCGCCTACGGGGAATTTGGAAAATTACTCCTTTTCGAGAT		WT
ClpP-dn1-R	TTCGGAAAGAGTATCCTTGTATGTC		
ClpP-up2-F	CTGTGTATGCTTTCTTGAACGCC	$\Delta clpP$	
ClpP-up2-R	ATCTCGAAAAGGAGTAATTTTGCAGTGACAAATATGTAATAGTA		WT
ClpP-dn2-F	TACTATTACATATTTGTCACTGCAAATTACTCCTTTTCGAGAT		
ClpP-dn2-R	TTCGGAAAGAGTATCCTTGTATGTC		
$\Delta clpC$ strain			
ClpC-up1-F	AGAGCCTGTCGGTAGAACAAGA	$\Delta clpC$ ::PPE	WT
ClpC-up1-R	ACTACAGAAAGCCTCTGGCGAAACAACCTGCTTTTCTTTTCGGCTTGCT		PPE
ClpC-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		WT
ClpC-PPE-R	CCAAATTCCCGTAGGCGCTAG		
ClpC-dn1-F	CTAGCGCCTACGGGGAATTTGGTCTAACTACTCCTCTTTTCTATCC	$\Delta clpC$	WT
ClpC-dn1-R	AGTAGATTTAGCGACCAGGAGGC		
ClpC-up2-F	AGAGCCTGTCGGTAGAACAAGA		WT
ClpC-up2-R	GGATAGGAAAGAGGAGTAGTTAGAACCTGCTTTTCTTTTCGGCTTGCT		
ClpC-dn2-F	AGCAAGCCGAAAGAAAAGCAGGTTCTAACTACTCCTCTTTTCTATCC		
ClpC-dn2-R	AGTAGATTTAGCGACCAGGAGGC		
$\Delta clpE$ strain			
ClpE-up1-F	GTGTGAATCGTTTGAATGGCAGC	$\Delta clpE$ ::PPE	WT
ClpE-up1-R	ACTACAGAAAGCCTCTGGCGAAACAGAAAATAGAGCTGCTCTCTACGA		PPE
ClpE-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		WT
ClpE-PPE-R	CCAAATTCCCGTAGGCGCTAG		
ClpE-dn1-F	CTAGCGCCTACGGGGAATTTGGAATTCTACCTCTTTCTGTGAA	$\Delta clpE$	WT
ClpE-dn1-R	AGATACATAGGCACCCGAGTTCA		
ClpE-up2-F	GTGTGAATCGTTTGAATGGCAGC		WT
ClpE-up2-R	TTCACAGAAAGAGGTAGAATTGAAAATAGAGCTGCTCTCTACGA		
ClpE-dn2-F	TCGTAGAGAGCAGCTCTATTTTCAATTCTACCTCTTTCTGTGAA		
ClpE-dn2-R	AGATACATAGGCACCCGAGTTCA		
$\Delta clpX$ strain			

ClpX-up1-F	TCGTTCTTGCTATTTCCAACCTTC	<i>ΔclpX</i> ::PPE	WT
ClpX-up1-R	ACTACAGAAAGCCTCTGGCGAAACAGTGTTTCCTCTTTCATATCTCTT		
ClpX-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		
ClpX-PPE-R	CCAAATTCCCCGTAGGCGCTAG		
ClpX-dn1-F	CTAGCGCCTACGGGGAATTTGGAAAAATAAAGGGTGGAAACT		
ClpX-dn1-R	GAATAGTCCCAGGTAGGGCGTTTA		
ClpX-up2-F	TCGTTCTTGCTATTTCCAACCTTC	<i>ΔclpX</i>	WT
ClpX-up2-R	AGTTTCCACCCTTTATTTTTGTGTTTCCTCTTTCATATCTCTT		
ClpX-dn2-F	AAGAGATATGAAAGAGGAAACACAAAAATAAAGGGTGGAAACT		
ClpX-dn2-R	GAATAGTCCCAGGTAGGGCGTTTA		
<i>ΔclpL</i> strain			
ClpL-up1-F	TGAAAGGAGATACTTGGACCGAT	<i>ΔclpL</i> ::PPE	WT
ClpL-up1-R	ACTACAGAAAGCCTCTGGCGAAACAAGTTTTTACCTCGTTTCATGTTA		
ClpL-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		
ClpL-PPE-R	CCAAATTCCCCGTAGGCGCTAG		
ClpL-dn1-F	CTAGCGCCTACGGGGAATTTGGAAATAGTGAAGAATTTGAAAAATC		
ClpL-dn1-R	TGACCATCTGCCGAGAAGTTATC		
ClpL-up2-F	TGAAAGGAGATACTTGGACCGAT	<i>ΔclpL</i>	WT
ClpL-up2-R	GATTTTTCAAATTCCTTCACTATTTAGTTTTTACCTCGTTTCATGTTA		
ClpL-dn2-F	TAACATGAAACGAGGTA AAAACTAAATAGTGAAGAATTTGAAAAATC		
ClpL-dn2-R	TGACCATCTGCCGAGAAGTTATC		
PIG (P <sub>1503</sub> :: <i>ireB-gfp</i> ) strain			
IreB-up3-F	TTGAAGAAGTTGCGACCGAAG	PIG (P <sub>1503</sub> :: <i>ireB-gfp</i> )	WT
IreB-up3-R	GAAAGCCTCTGGCGAAACA ACTTACACCTTCTTTCCCTA		
Peno-F	TGTTTCGCCAGAGGCTTTC		PPE
Peno-R	CGGTTTCTTCGGTAAATCCATTATATTACTCTCCTTTGAGTT		
IreB-F	ATGGGATTTACCGAAGAAACCGT		WT
IreB-F	CAGCGGAGCCAGCGGATCCGAGGTCAATCCATTCCCTTTC		
Linker-gfp-F	GGATCCGCTGGCTCCGCTGCTGGTTCTGGCGAATTCATGTCAAAGGAGAAGAC		P8
Linker-gfp-R	TTACTTATAAAGCTCATCCATG		
IreB-dn3-F	GGCATGGATGAGCTTTATAAGTAATGAGAATAATGGGATTAGACG		WT
IreB-dn3-R	ATTCATTCTCCCCTTGCTATTT		

IreB-up3-F	TTGAAGAAGTTGCGACCGAAG	IG( <i>ireB-gfp</i> )	WT
IreB-up3-R	GAAAGCCTCTGGCGAAACAACCTTACACCTTCTTTCCCTAT		PIG
IreB-Linker-gfp-F	TGTTTCGCCAGAGGCTTTC		
IreB-Linker-gfp-R	TTACTTATAAAGCTCATCCATGCC		WT
IreB-dn3-F	GGCATGGATGAGCTTTATAAGTAATGAGAATAATGGGATTAGACG		
IreB-dn3-R	ATTCATTCCCTCCCCTTGCTATTT		
PI(I73R/Y80E)G (P <sub>1503</sub> :: <i>ireB(I73RY80E)-gfp</i> ) strain			
IreB(I73R/Y80E)-up1-F	ATAGGTGTGTATGAAGTTGTTTAGT	<i>ireB(I73R/Y80E)</i>	WT
IreB(I73R/Y80E)-up1-R	ACGGTTTCTTCGGTAAATCCCATACTTACACCTTCTTTCCCTATT		P9
I73RY80E-F	ATGGGATTTACCGAAGAAACCGT		WT
I73RY80E-R	TTCGTAGCGCACCAATTCTTCA		
IreB(I73R/Y80E)-dn1-F	GGAATGGGATTGACCTCTAATGAGAATAATGGGATTAGACGTC		PI(I73R/Y80E)G (P <sub>1503</sub> :: <i>ireB(I73RY80E)-gfp</i> )
IreB(I73R/Y80E)-dn1-R	TCTTACCAAACCTCTTCTTGACCGT	PIG	
IreB(I73R/Y80E)-up1-F	ATAGGTGTGTATGAAGTTGTTTAGT	PI(I73R/Y80E)G (P <sub>1503</sub> :: <i>ireB(I73RY80E)-gfp</i> )	P9
IreB(I73R/Y80E)-up1-R	CGGTTTCTTCGGTAAATCCCATTATATTACTCTCCTTTGAGTT		WT
I73RY80E-F	ATGGGATTTACCGAAGAAACCGT		
I73RY80E-R	TTCGTAGCGCACCAATTCTTCA		
IreB(I73R/Y80E)-dn1-F	GGAATGGGATTGACCTCTAATGAGAATAATGGGATTAGACGTC		
IreB(I73R/Y80E)-dn1-R	TCTTACCAAACCTCTTCTTGACCGT		
<i>ireB(T4A/T7A)</i> strain			
IreB-up4-F	TTGAAGAAGTTGCGACCGAAG	<i>ireB(T4A/T7A)</i>	WT
IreB-up4-R	ACTTACACCTTCTTTCCCTAT		P6
IreB-T4A/T7A-F	ATAGGGAAAGAAGGTGTAAGTATGGGATTTGCCGAAGAAGCCG		
IreB-T4A/T7A-R	CGTCTAATCCCATTATTCTCATTAGAGGTCAATCCCATTCCCTTTC		WT
IreB-dn4-F	TGAGAATAATGGGATTAGACG		
IreB-dn4-R	ATTCATTCCCTCCCCTTGCTATTT		
<i>ireB(T4E/T7E)</i> strain			
IreB-up4-F	TTGAAGAAGTTGCGACCGAAG	<i>ireB(T4E/T7E)</i>	WT
IreB-up4-R	ACTTACACCTTCTTTCCCTAT		P7
IreB-T4E/T7E-F	ATAGGGAAAGAAGGTGTAAGTATGGGATTTGAAGAAGAAGAAG		
IreB-T4E/T7E-R	CGTCTAATCCCATTATTCTCATTAGAGGTCAATCCCATTCCCTTTC		WT
IreB-dn4-F	TGAGAATAATGGGATTAGACG		

IreB-dn4-R	ATTCATTCTCCCCTTGCTATTT		WT
PIG-TA(P <sub>1503</sub> - <i>ireB(T4A/T7A)</i> - <i>gfp</i> ) strain			
IreB-up4-F	TTGAAGAAGTTGCGACCGAAG	PIG-TA (P <sub>1503</sub> - <i>ireB(T4A/T7A)</i> - <i>gfp</i> )	WT
IreB-up4-R	ACTTACACCTTCTTTCCCTAT		
IreB-T4A/T7A-F	ATAGGGAAAGAAGGTGTAAGTATGGGATTTGCCGAAGAAGCCG		P6
IreB-T4A/T7A-R	CGTCTAATCCCATTATTCTCATTAGAGGTCAATCCCATTCCCTTTC		
IreB-dn4-F	TGAGAATAATGGGATTAGACG		WT
IreB-dn4-R	ATTCATTCTCCCCTTGCTATTT		
PIG-TE (P <sub>1503</sub> - <i>ireB(T4E/T7E)</i> - <i>gfp</i> ) strain			
IreB-up4-F	TTGAAGAAGTTGCGACCGAAG	PIG-TE(P <sub>1503</sub> - <i>ireB(T4E/T7E)</i> - <i>gfp</i> )	WT
IreB-up4-R	ACTTACACCTTCTTTCCCTAT		
IreB-T4E/T7E-F	ATAGGGAAAGAAGGTGTAAGTATGGGATTTGAAGAAGAAGAAG		P7
IreB-T4E/T7E-R	CGTCTAATCCCATTATTCTCATTAGAGGTCAATCCCATTCCCTTTC		
IreB-dn4-F	TGAGAATAATGGGATTAGACG		WT
IreB-dn4-R	ATTCATTCTCCCCTTGCTATTT		
PIG $\Delta$ <i>stk</i> strain			
STK-up1-F	ATCGATGGATTTTGATTCTCTAAAGA	PIG $\Delta$ <i>stk</i> ::PPE	WT
STK-up1-R	ACTACAGAAAGCCTCTGGCGAAACATTACCTAGCCTCCTCCGTAAT		
STK-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		PPE
STK-PPE-R	CCAAATTCCCCGTAGGCGCTAG		
STK-dn1-F	CTAGCGCCTACGGGAATTTGGAGATGAATAAGGTTGGGGAGAT		WT
STK-dn1-R	ACCTATCTTGAGAGTGGTCGTGG		
STK-up2-F	ATCGATGGATTTTGATTCTCTAAAGA	PIG $\Delta$ <i>stk</i>	WT
STK-up2-R	ATCTCCCCAACCTTATTCATCTTTACCTAGCCTCCTCCGTAAT		
STK-dn2-F	ATTACGGAGGAGGCTAGGTAAAGATGAATAAGGTTGGGGAGAT		
STK-dn2-R	ACCTATCTTGAGAGTGGTCGTGG		
PIG $\Delta$ <i>stp</i> strain			
STP-up1-F	TATCCGTTTCAGTATTCTGTGCCA	PIG $\Delta$ <i>stp</i> ::PPE	WT
STP-up1-R	ACTACAGAAAGCCTCTGGCGAAACAAATTTTATCGTTGCTAAGCAA		
STP-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		PPE <sup>2</sup>
STP-PPE-R	CCAAATTCCCCGTAGGCGCTAG		

STP-dn1-F	CTAGCGCCTACGGGGAATTTGGATGATTCAAATCGGTAAGATCTT		WT
STP-dn1-R	CTTCGCCACTTCTTTCTTACCAG		
STP-up2-F	TATCCGTTCAAGTATTCTGTGCCA	PIG $\Delta$ stp	WT
STP-up2-R	AAGATCTTACCGATTTGAATCATAATTTTATCGTTGCTAAGCAA		
STP-dn2-F	TTGCTTAGCAACGATAAAAATTATGATTCAAATCGGTAAGATCTT		
STP-dn2-R	CTTCGCCACTTCTTTCTTACCAG		
PIG-TE $\Delta$ stk strain			
STK-up1-F	ATCGATGGATTTTGATTCTCTAAAGA	PIG-TE $\Delta$ stk ::PPE	WT
STK-up1-R	ACTACAGAAAGCCTCTGGCGAAACATTACCTAGCCTCCTCCGTAAT		
STK-PPE-F	TGTTTCGCCAGAGGCTTTCTGTAGT		PPE
STK-PPE-R	CCAAATCCCCGTAGGCGCTAG		
STK-dn1-F	CTAGCGCCTACGGGGAATTTGGAGATGAATAAGGTTGGGGAGAT		WT
STK-dn1-R	ACCTATCTTGAGAGTGGTCGTGG		
STK-up2-F	ATCGATGGATTTTGATTCTCTAAAGA	PIG-TE $\Delta$ stk	WT
STK-up2-R	ATCTCCCCAACCTTATTCATCTTTACCTAGCCTCCTCCGTAAT		
STK-dn2-F	ATTACGGAGGAGGCTAGGTAAAGATGAATAAGGTTGGGGAGAT		
STK-dn2-R	ACCTATCTTGAGAGTGGTCGTGG		
$\Delta$ murA $\Delta$ ireB strain			
IreB-up1-F	CTTGATGGCGGTATTGAA	$\Delta$ murA $\Delta$ ireB ::PPE	WT
IreB-up1-R	ACTTACACCTTCTTTCCCT		
IreB-PPE-F	AGGGAAAGAAGGTGTAAGTTGTTTCGCCAGAGGCTT		PPE
IreB-PPE-R	ACGTCTAATCCATTATTCTCACCAAATCCCCGTAGGC		
IreB-dn1-F	TGAGAATAATGGGATTAGACGT		WT
IreB-dn1-R	TCTGCTGTTGCGTCTTCT		
IreB-up2-F	CTTGATGGCGGTATTGAA	$\Delta$ murA $\Delta$ ireB	WT
IreB-up2-R	ACTTACACCTTCTTTCCCT		
IreB-dn2-F	AGGGAAAGAAGGTGTAAGTTGAGAATAATGGGATTAGACGT		
IreB-dn2-R	TCTGCTGTTGCGTCTTCT		
$\Delta$ murZ $\Delta$ ireB strain			
IreB-up1-F	CTTGATGGCGGTATTGAA	$\Delta$ murZ $\Delta$ ireB ::PPE	WT
IreB-up1-R	ACTTACACCTTCTTTCCCT		
IreB-PPE-F	AGGGAAAGAAGGTGTAAGTTGTTTCGCCAGAGGCTT		PPE

IreB-PPE-R	<b>ACGTCTAATCCCATTATTCTCACCAAATTCCCCGTAGGC</b>	<i>ΔmurZ ΔireB</i>	
IreB-dn1-F	TGAGAATAATGGGATTAGACGT		WT
IreB-dn1-R	TCTGCTGTTGCGTCTTCT	<i>ΔmurZ ΔireB</i>	
IreB-up2-F	CTTGATGGCGGTATTGAA		
IreB-up2-R	ACTTACACCTTCTTCCCT		WT
IreB-dn2-F	<b>AGGGAAAGAAGGTGTAAGTTGAGAATAATGGGATTAGACGT</b>		
IreB-dn2-R	TCTGCTGTTGCGTCTTCT		

Note: Bold nucleotides indicate the overlapping regions designed for overlap extension PCR to assemble the target DNA fragments. Underlined sequences denote the codons for amino acid substitutions introduced by site-directed mutagenesis.