

**Sequence S1** Nucleotide sequence of the *pepX* gene and the translated amino acid sequence from *Lactobacillus helveticus* ATCC 12046. Elements from the pET20b (+) are underlined. The restriction sites (*NdeI* and *XhoI*) are noted in *italics*. The last amino acid of PepX is K. The amino acids L and E originate from the *XhoI* restriction site, followed by the His<sub>6</sub> tag. The stop codon is denoted by \*.

***NdeI***

GGA GAT ATA CAT ATG AAA TAT AAC CAA TAT GCT TAC GTT GAA ACC GAC TTT CAA CAA CAA < 60  
M K Y N Q Y A Y V E T D F Q Q Q

GTT AAA GAA TTA ATC GAT ATC AAC TTC TTA CCT AAA AAT TAT CAA GTC TGG GAC TTC AGC < 120  
V K E L I D I N F L P K N Y Q V W D F S

AGT CTT TTA GCT AAA TTA GTT AAA AAT GCA ATC GCT GAG GCT AAA ACA GAT GCC GCT AAA < 180  
S L L A K L V K N A I A E A K T D A A K

AAT GCC AAA CTT GCG GAA TTT GCA GTT TCT GAT CAC CAG ACC TTG GCT GAT TTT CTT AAG < 240  
N A K L A E F A V S D H Q T L A D F L K

GAA AAG CCA ACA GAA ATT GGT ACC AAA CAA TTC TAC AAC GTA GCT CTG CAA CTT CTT GGC < 300  
E K P T E I G T K Q F Y N V A L Q L L G

TAC CAC GTC CAC TAC GAC TAT GAT TTT GCT GAT CCA ACC GGT TTC ATG CAA AGA AAT GCT < 360  
Y H V H Y D Y D F A D P T G F M Q R N A

TTG CCA TTT TTG CAA GAC ATC AGC GAC AAT CAA AAA TTA ATC TCT GCC TTT TAC CGC TTG < 420  
L P F L Q D I S D N Q K L I S A F Y R L

CTC AAT ACC CGT GCT AAA AAC GGA CAA ATC TTG CTC GAT GTG ATG GCA GGC AAA GGC TAC < 480  
L N T R A K N G Q I L L D V M A G K G Y

TTT ACT CAA TTC TGG GGT CAA AAC AAG TTC AAG TTC TTC AAT GGT AAA TCT ATC CCT GTT < 540  
F T Q F W G Q N K F K F F N G K S I P V

TTT GAC ACA AAT AAG GTC ATT CGT GAA GTC GTT TAT GTC GAA ACT GAT CTT GAT ACT GAC < 600  
F D T N K V I R E V V Y V E T D L D T D

CAT GAT GGC AAG AGT GAT TTA ATT CAA GTT ACT GTT TTC CGT CCT GAA GAA ACT AAT AAG < 660  
H D G K S D L I Q V T V F R P E E T N K

GGC CTT AAA GTA CCT GCA CTC TAC ACT GCA TCC CCA TAC TTT GGC GGA ATC ATC GCC AAC < 720  
G L K V P A L Y T A S P Y F G G I I A N

GAA AAA CGC AAC CAT AAC GTT GAC GAA AAT CTC TCT GAC TCT ACC GAA TGG AAT GAT CCA < 780  
E K R N H N V D E N L S D S T E W N D P

CAA TAC GTT CAC TCT CCA ATC GTT AAG GCT GAA AAG CCA GAT GGT TCA AGC CGT CCA GCT < 840  
Q Y V H S P I V K A E K P D G S S R P A

ACA GAG GAG GCA GTG CAC AAG TCC TCT TAC CCA TTA AAC GAA TAC ATG CTA GCT CGC GGT < 900  
T E E A V H K S S Y P L N E Y M L A R G

TTT GCT AGC GTC TTT GCT GGT GCA ATT GGT ACT CGC GGC AGC GAT GGT GTC CGC ATC ACT < 960  
F A S V F A G A I G T R G S D G V R I T

GGT GCT CCA GAA GAA ACT GAA TCA GCT GCT GCA GTT ATC GAA TGG CTG CAT GGT GAT CGT < 1020  
G A P E E T E S A A A V I E W L H G D R

GTT GCC TAC ACT GAT AGA ACC AGA ACC GTT CAA ACT ACA GCT GAT TGG TGC AAC GGC AAC < 1080  
V A Y T D R T R T V Q T T A D W C N G N

ATC GGT ATG ACC GGT CGT TCA TAT CTT GGT ACT TTG CAA ATC GCC ATT GCC ACA ACT GGC < 1140  
I G M T G R S Y L G T L Q I A I A T T G

GTT AAG GGT CTT AAG ACT GTC GTT TCT GAA GCC GCA ATT TCA TCA TGG TAC GAC TAC TAC < 1200  
V K G L K T V V S E A A I S S W Y D Y Y

CGT GAA CAT GGT TTG GTT ATT GCT CCT GAA GCT TGC CAA GGT GAA GAC CTT GAT TTG CTC < 1260  
R E H G L V I A P E A C Q G E D L D L L

GCT GAA ACC TGT CAA TCA AAC TTA TGG GAT GCC GGT TCA TAC CTT AAG ATC AAG CCT GAA < 1320  
A E T C Q S N L W D A G S Y L K I K P E  
TAC GAC AAA ATG CAA AAG CAG TTG CGT GAA AAA GAA GAC CGT AAT ACT GGT CAA TAC TCT < 1380  
Y D K M Q K Q L R E K E D R N T G Q Y S  
GAC TTC TGG GAA GCT AGA AAC TAC CGT CAC CAC GCT GAT GGT ATC AAG TGC TCC TGG ATT < 1440  
D F W E A R N Y R H H A D G I K C S W I  
TCC GTT CAT GGT TTA AAT GAC TGG AAT GTT AAG CCA AAG AAC GTT TAC AAA ATC TGG CAA < 1500  
S V H G L N D W N V K P K N V Y K I W Q  
CTA GTT AAA AAG ATG CCA ATG AAG CAT CAC CTC TTC TTG CAC CAA GGT CCG CAC TAC AAT < 1560  
L V K K M P M K H H L F L H Q G P H Y N  
ATG AAC AAC TTA GTT TCC ATC GAC TTT ACA GAC TTA ATG AAC CTC TGG TTT GTT CAT GAA < 1620  
M N N L V S I D F T D L M N L W F V H E  
CTT TTA GGC ATT GAA AAT AAT GCT TAC AAT CAA TGG CCA ACG GTT ATG ATT CAA GAT AAC < 1680  
L L G I E N N A Y N Q W P T V M I Q D N  
TTG CAA GCT GAC AAG TGG CAT GAA GAA CCT GAC TGG AGC AAT GAT TTA GGC CAA GAA AAG < 1740  
L Q A D K W H E E P D W S N D L G Q E K  
ATC TAC TAC CCT ACT GAT GAA GGC GAA CTT TTC CAA GAT GGC AAC GGC AAA GCA CAA AAG < 1800  
I Y Y P T D E G E L F Q D G N G K A Q K  
TCC TTT ACC GAT GTT GGC GGT ATT GAA TTC AAG AAA GCT GGT ATT TCA GAA AGC GAT TGG < 1860  
S F T D V G G I E F K K A G I S E S D W  
CAA TAC AAG TTC ATT TGC GGT GAT GAA AAA TGG GCT AAG CCA AGT TTA CGT TTT GAA ACT < 1920  
Q Y K F I C G D E K W A K P S L R F E T  
GAT GAA TTT ACC CAC CCT ACT ACC ATC GTG GGT CGT CCA GAA GTT AAA GTT AGA GTT TCT < 1980  
D E F T H P T T I V G R P E V K V R V S  
GCT AGT CTG CCA AAG GGT GAG ATT TCC GTT GCC TTA GTT GAA CTG GGC GAA AGA CAA CGA < 2040  
A S L P K G E I S V A L V E L G E R Q R  
CTT ACT GCT ACT CCT AAA TTC TTA ATG CAT GGC GGA CAA GAA TTA GGC TAC CGT TTT GGC < 2100  
L T A T P K F L M H G G Q E L G Y R F G  
ACT GAC ACT TTA CAA GAA TTT GTT CCA GAT AAA AAG ACT AAA GCC AAG TTG ATT ACT AAG < 2160  
T D T L Q E F V P D K K T K A K L I T K  
GCT CAC ATG AAC TTG CAA AAC TTC AAG GAT ATG AAG AAG CCT GAA GCA ATC GAC GCC GAT < 2220  
A H M N L Q N F K D M K K P E A I D A D  
AAG TTC TAC GAC TTG GAC TTC TTG CTT CAA CCT ACT TAT TAC ACC ATC CCA TCT GGC AGC < 2280  
K F Y D L D F L L Q P T Y Y T I P S G S  
AAG CTT GCT TTG ATC ATT TAT TCA ACT GAC CAA GGC ATG ACT AAG CGT CCG CTT GAA GAT < 2340  
K L A L I I Y S T D Q G M T K R P L E D  
GAA ACT TAC ACA ATT GAT TTA GCT AAT ACT GAA ATC AAG TTT TAT GAA AAA CTC GAG CAC < 2400  
E T Y T I D L A N T E I K F Y E K L E H  
**XhoI**  
CAC CAC CAC CAC CAC TGA GAT CCG GCT GCT AAC < 2433  
H H H H H \*