CLAIMS

1. A fusion protein composed of an ~~enzyme~~ endolysin having the activity of degrading the cell wall of Gram-negative bacteria and a peptide stretch fused to the enzyme at the N- or C-terminus or at both termini, wherein the peptide stretch is an amphipatic peptide, sushi peptide, defensin, hydrophobic peptide or an antimicrobial peptide, wherein the antimicrobial peptide exhibits an amino acid sequence according to SEQ ID NO: 6 to 16 or 26 to 31.

2. The fusion protein according to claim 1, wherein said fusion protein exhibits an amino acid sequence according to SEQ ID NO: 63 to 90.

3. The fusion protein according to claim 1 or 2, wherein said fusion protein exhibits an additional amino acid residue on the N-terminus.

4. The fusion protein according to any of the preceding claims, wherein said fusion protein comprises a tag or additional protein on the C- and/or N-terminus.

5. The fusion protein according to claim 4, wherein said tag or additional protein is linked to the fusion protein by one or more additional amino acid residues.

6. The fusion protein according to any of the preceding claims, wherein the peptide ~~stetch~~ stretch is linked to the fusion protein by one or more additional amino acid residues.

~~7. The fusion protein according to claim 1, wherein the enzyme is an endolysin, autolysin or a bacteriocin.~~

~~8~~7. The fusion protein according to claim ~~7~~6, wherein the enzyme exhibits an amino acid sequence according to SEQ ID NO: 22-25.

~~9. The fusion protein according to claim 1, wherein the antimicrobial peptide exhibits an amino acid sequence according to SEQ ID NO: 6 to 16 or 26 to 31.~~

~~10~~8. The fusion protein according to claim 1, wherein the sushi peptide exhibits an amino acid sequence according to SEQ ID NO: 32.

~~11~~9. The fusion protein according to claim 1, wherein the hydrophobic peptide exhibits an amino acid sequence according to SEQ ID NO: 28, 33 or 35.

~~12~~10. The fusion protein according to any of the preceding claims, wherein the Gram-negative bacteria are selected from the group consisting of

Enterobacteriaceae,

in particular Escherichia, Salmonella, Shigella, Citrobacter, Edwardsiella, Enterobacter, Hafnia, Klebsiella, Morganella, Proteus, Providencia, Serratia, and Yersinia,

Pseudomonadaceae,

in particular Pseudomonas, Burkholderia, Stenotrophomonas, Shewanella, Sphingomonas and Comamonas,

Neisseria, Moraxella, Vibrio, Aeromonas, Brucella, Francisella, Bordetella, Legionella, Bartonella, Coxiella, Haemophilus, Pasteurella, Mannheimia, Actinobacillus, Gardnerella, Spirochaetaceae,

in particular Treponema and Borrelia,

Leptospiraceae, Campylobacter, Helicobacter, Spirillum, Streptobacillus, Bacteroidaceae,

in particular Bacteroides, Fusobacterium, Prevotella and Porphyromonas, and Acinetobacter,

in particular A. baumanii.

~~13~~11. The fusion protein according to claim 1, wherein the amphipatic peptide comprises at least one positively charged amino acid residue selected out of the group consisting of lysine, arginine and histidine residues, combined to at least one hydrophobic amino acid residue selected out of the group consisting of valine, isoleucine, leucine, methionine, phenylalanine, tryptophan, cysteine, alanine, tyrosine, histidine, threonin, serine, proline and glycine residues.

~~14~~12. The fusion protein according to claim 1, wherein at least about 70% of the said amino acid residues in said amphipatic peptide are either arginine or lysine residues and at least about 30% of the said amino acid residues in said amphipatic peptide are valine, isoleucine, leucine, methionine, phenylalanine, tryptophan, cysteine, alanine, tyrosine, histidine, threonin, serine, proline or glycine residues.

~~15~~3. The fusion protein according to any of the preceding claims, wherein the peptide stretch comprises about 5 to about 100 amino acid residues, in particular about 5 to 50 amino acid residues, in particular about 5 to 30 amino acid residues.

~~16~~14. An isolated nucleic acid molecule encoding a fusion protein according to any of claims 1 to ~~15~~13.

~~17~~15. A vector comprising the nucleic acid molecule according to claim ~~16~~14.

~~18~~16. A host cell comprising the nucleic acid molecule according to claim ~~16~~ 14 or the vector according to claim ~~17~~15.

~~19~~17. A host cell according to claim ~~18~~16, wherein the cell is a bacterial cell or a yeast cell.

~~20~~18. The fusion protein according to any one of claims 1 to ~~15~~ 13 for use as a medicament, diagnostic means or cosmetic substance.

~~21~~19. The fusion protein according to any one of claims 1 to ~~15~~ 13 for use as a medicament for treatment or prevention of Gram-negative bacterial infections.

~~22~~20. The fusion protein according to any one of claims 1 to ~~15~~ 13 for use as a disinfectant.

~~23~~21. The use of the fusion protein according to any one of claims 1 to ~~15~~ 13 for the treatment or prevention of Gram-negative bacterial contamination of foodstuff, of food processing equipment, of food processing plants, of surfaces coming into contact with foodstuff, of medical devices, of surfaces in hospitals and surgeries.

~~24~~22. The use of the fusion protein according to any one of claims 1 to ~~15~~ 3 as a diagnostic means in medicinal, food or feed or environmental diagnostics.

~~25~~23. Pharmaceutical composition comprising a fusion protein according to any one of claims 1 to ~~15~~13.