

SEQUENCE LISTING

<110> HANSA BIOPHARMA AB

<120> CYSTEINE PROTEASE

<130> N416746W0

<150> GB 2007431.6

<151> 2020-05-19

<160> 23

<170> PatentIn version 3.5

<210> 1

<211> 312

<212> PRT

<213> Streptococcus equi ssp. Zooepidemicus

<400> 1

Asp	Asp	Tyr	Gln	Arg	Asn	Ala	Thr	Glu	Ala	Tyr	Ala	Lys	Glu	Val	Pro
1				5				10					15		

His	Gln	Ile	Thr	Ser	Val	Trp	Thr	Lys	Gly	Val	Thr	Pro	Pro	Glu	Gln
		20						25					30		

Phe	Thr	Gln	Gly	Glu	Asp	Val	Ile	His	Ala	Pro	Tyr	Leu	Ala	His	Gln
		35					40					45			

Gly	Trp	Tyr	Asp	Ile	Thr	Lys	Ala	Phe	Asn	Gly	Lys	Asp	Asp	Leu	Leu
	50					55					60				

Cys	Gly	Ala	Ala	Thr	Ala	Gly	Asn	Met	Leu	His	Trp	Trp	Phe	Asp	Gln
65					70					75				80	

Asn	Lys	Thr	Glu	Ile	Glu	Ala	Tyr	Leu	Ser	Lys	His	Pro	Glu	Lys	Gln
				85					90					95	

Lys	Ile	Ile	Phe	Arg	Asn	Gln	Glu	Leu	Phe	Asp	Leu	Lys	Ala	Ala	Ile
			100					105					110		

Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg
 115 120 125

Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro
 130 135 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
 145 150 155 160

Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys
 165 170 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr
 180 185 190

Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
 195 200 205

Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu
 210 215 220

Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
 225 230 235 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
 245 250 255

Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
 260 265 270

Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
 275 280 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
 290 295 300

Lys Asp Ile Trp Gln Lys Leu Ser
 305 310

<210> 2
 <211> 292
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 2

Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln Phe Thr Gln Gly
 1 5 10 15

Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln Gly Trp Tyr Asp
 20 25 30

Ile Thr Lys Ala Phe Asn Gly Lys Asp Asp Leu Leu Cys Gly Ala Ala
 35 40 45

Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln Asn Lys Thr Glu
 50 55 60

Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln Lys Ile Ile Phe
 65 70 75 80

Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala Ile Asp Thr Lys Asp
 85 90 95

Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg Asp Lys Ala Phe
 100 105 110

Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro Asp Leu Val Leu
 115 120 125

Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe Lys Thr Gln Ser
 130 135 140

Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys Arg Gly Gly Ile
 145 150 155 160

Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr Leu Leu Thr Ala

165

170

175

Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile Ser Thr Ile Ile
 180 185 190

Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu Ser His Thr Tyr
 195 200 205

Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp Gly Ala Asp Phe
 210 215 220

Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr Asp Ser Asp Ala
 225 230 235 240

Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Ile Asn Ala His
 245 250 255

Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly Glu Asn Ile Gly
 260 265 270

Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly Lys Asp Ile Trp
 275 280 285

Gln Lys Leu Ser
 290

<210> 3
 <211> 315
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 3

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
 1 5 10 15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
 20 25 30

Glu Gln Phe Arg Tyr Asn Asn Glu Asp Val Ile His Ala Pro Tyr Leu
 35 40 45

Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp
 50 55 60

Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp
 65 70 75 80

Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro
 85 90 95

Glu Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu Lys
 100 105 110

Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn
 115 120 125

Tyr Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly
 130 135 140

Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu
 145 150 155 160

Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp
 165 170 175

Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp
 180 185 190

Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu
 195 200 205

Asn Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala
 210 215 220

Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile
 225 230 235 240

Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile
 245 250 255

Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr
 260 265 270

Phe Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys
 275 280 285

Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu
 290 295 300

Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser
 305 310 315

<210> 4
 <211> 310
 <212> PRT
 <213> Streptococcus pyogenes

<400> 4

Asp Ser Phe Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr Pro
 1 5 10 15

Tyr His Val Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Ala Asn
 20 25 30

Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala Asn Gln
 35 40 45

Gly Trp Tyr Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp Leu Leu
 50 55 60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
 65 70 75 80

Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu Lys Gln

85

90

95

Lys Ile Asn Phe Asn Gly Glu Gln Met Phe Asp Val Lys Glu Ala Ile
 100 105 110

Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe Glu Tyr Phe Lys
 115 120 125

Glu Lys Ala Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val Phe Pro
 130 135 140

Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser Leu Thr
 145 150 155 160

Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro Arg Gly
 165 170 175

Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Ser Lys Leu Leu
 180 185 190

Thr Ser Arg His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile Ser Asp
 195 200 205

Leu Ile Lys Lys Glu Leu Thr Glu Gly Lys Ala Leu Gly Leu Ser His
 210 215 220

Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp Gly Ala
 225 230 235 240

Asp Phe Asp Ser Asn Gly Asn Leu Lys Ala Ile Tyr Val Thr Asp Ser
 245 250 255

Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Val Asn
 260 265 270

Ser Ala Gly Lys Val Ala Ile Ser Ala Lys Glu Ile Lys Glu Asp Asn
 275 280 285

Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly Gln Asp
 290 295 300

Ser Trp Asn Gln Thr Asn
 305 310

<210> 5
 <211> 349
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 5

Met Lys Thr Ile Ala Tyr Pro Asn Lys Pro His Ser Leu Ser Ala Gly
 1 5 10 15

Leu Leu Thr Ala Ile Ala Ile Phe Ser Leu Ala Ser Ser Asn Ile Thr
 20 25 30

Tyr Ala Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu
 35 40 45

Val Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu
 50 55 60

Thr Pro Glu Gln Phe Arg Tyr Asn Asn Glu Asp Val Ile His Ala Pro
 65 70 75 80

Tyr Leu Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly
 85 90 95

Lys Asp Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His
 100 105 110

Trp Trp Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys
 115 120 125

His Pro Glu Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp
 130 135 140

Leu Lys Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu
 145 150 155 160

Phe Asn Tyr Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln
 165 170 175

Leu Gly Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr
 180 185 190

Tyr Leu Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr
 195 200 205

Gln Asp Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg
 210 215 220

Gly Asp Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys
 225 230 235 240

Gly Leu Asn Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly
 245 250 255

Arg Ala Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His
 260 265 270

Val Ile Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu
 275 280 285

Ala Ile Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys
 290 295 300

Lys Tyr Phe Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala
 305 310 315 320

Lys Lys Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe
 325 330 335

Thr Leu Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser
 340 345

<210> 6
 <211> 339
 <212> PRT
 <213> Streptococcus pyogenes
 <400> 6

Met Arg Lys Arg Cys Tyr Ser Thr Ser Ala Ala Val Leu Ala Ala Val
 1 5 10 15

Thr Leu Phe Val Leu Ser Val Asp Arg Gly Val Ile Ala Asp Ser Phe
 20 25 30

Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr Pro Tyr His Val
 35 40 45

Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Ala Asn Phe Thr Gln
 50 55 60

Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala Asn Gln Gly Trp Tyr
 65 70 75 80

Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp Leu Leu Cys Gly Ala
 85 90 95

Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln Asn Lys Asp
 100 105 110

Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu Lys Gln Lys Ile Asn
 115 120 125

Phe Asn Gly Glu Gln Met Phe Asp Val Lys Glu Ala Ile Asp Thr Lys
 130 135 140

Asn His Gln Leu Asp Ser Lys Leu Phe Glu Tyr Phe Lys Glu Lys Ala
 145 150 155 160

Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val Phe Pro Asp His Val
 165 170 175

Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser Leu Thr Asn His Gly
 180 185 190

Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro Arg Gly Gly Ile Phe
 195 200 205

Asp Ala Val Phe Thr Arg Gly Asp Gln Ser Lys Leu Leu Thr Ser Arg
 210 215 220

His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile Ser Asp Leu Ile Lys
 225 230 235 240

Lys Glu Leu Thr Glu Gly Lys Ala Leu Gly Leu Ser His Thr Tyr Ala
 245 250 255

Asn Val Arg Ile Asn His Val Ile Asn Leu Trp Gly Ala Asp Phe Asp
 260 265 270

Ser Asn Gly Asn Leu Lys Ala Ile Tyr Val Thr Asp Ser Asp Ser Asn
 275 280 285

Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Val Asn Ser Ala Gly
 290 295 300

Lys Val Ala Ile Ser Ala Lys Glu Ile Lys Glu Asp Asn Ile Gly Ala
 305 310 315 320

Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly Gln Asp Ser Trp Asn
 325 330 335

Gln Thr Asn

<210> 7

<211> 313
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 7

Met Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val
 1 5 10 15

Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu
 20 25 30

Gln Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His
 35 40 45

Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu
 50 55 60

Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp
 65 70 75 80

Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys
 85 90 95

Gln Lys Ile Ile Phe Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala
 100 105 110

Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe
 115 120 125

Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met
 130 135 140

Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val
 145 150 155 160

Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp
 165 170 175

Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Thr
 180 185 190

Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp
 195 200 205

Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala
 210 215 220

Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu
 225 230 235 240

Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val
 245 250 255

Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val
 260 265 270

Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu
 275 280 285

Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser
 290 295 300

Gly Lys Asp Ile Trp Gln Lys Leu Ser
 305 310

<210> 8
 <211> 313
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 8

Met Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val
 1 5 10 15

Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu
 20 25 30

Gln Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His
 35 40 45

Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu
 50 55 60

Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp
 65 70 75 80

Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys
 85 90 95

Gln Lys Ile Ile Phe Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala
 100 105 110

Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe
 115 120 125

Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met
 130 135 140

Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val
 145 150 155 160

Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp
 165 170 175

Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr
 180 185 190

Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp
 195 200 205

Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala
 210 215 220

Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu

Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys
 85 90 95

Gln Lys Ile Ile Phe Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala
 100 105 110

Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe
 115 120 125

Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met
 130 135 140

Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val
 145 150 155 160

Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp
 165 170 175

Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr
 180 185 190

Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp
 195 200 205

Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala
 210 215 220

Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu
 225 230 235 240

Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val
 245 250 255

Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val
 260 265 270

Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu
 275 280 285

Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser
 290 295 300

Gly Lys Asp Ile Trp Gln Lys Leu Ser Gly Gly Gly His His His His
 305 310 315 320

His His

<210> 10
 <211> 313
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 10

Met Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val
 1 5 10 15

Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu
 20 25 30

Gln Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His
 35 40 45

Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asn Gly Lys Asp Asp Leu
 50 55 60

Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp
 65 70 75 80

Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys
 85 90 95

Gln Lys Ile Ile Phe Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala
 100 105 110

Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe

115

120

125

Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met
 130 135 140

Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val
 145 150 155 160

Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp
 165 170 175

Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr
 180 185 190

Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp
 195 200 205

Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala
 210 215 220

Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu
 225 230 235 240

Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val
 245 250 255

Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val
 260 265 270

Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu
 275 280 285

Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser
 290 295 300

Gly Lys Asp Ile Trp Gln Lys Leu Ser
 305 310

<210> 11
 <211> 302
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 11

Met Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln Phe Thr Gln
 1 5 10 15

Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln Gly Trp Tyr
 20 25 30

Asp Ile Thr Lys Ala Phe Asn Gly Lys Asp Asp Leu Leu Cys Gly Ala
 35 40 45

Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln Asn Lys Thr
 50 55 60

Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln Lys Ile Ile
 65 70 75 80

Phe Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala Ile Asp Thr Lys
 85 90 95

Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg Asp Lys Ala
 100 105 110

Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro Asp Leu Val
 115 120 125

Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe Lys Thr Gln
 130 135 140

Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys Arg Gly Gly
 145 150 155 160

Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr Leu Leu Thr
 165 170 175

Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile Ser Thr Ile
 180 185 190

Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu Ser His Thr
 195 200 205

Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp Gly Ala Asp
 210 215 220

Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr Asp Ser Asp
 225 230 235 240

Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Ile Asn Ala
 245 250 255

His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly Glu Asn Ile
 260 265 270

Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly Lys Asp Ile
 275 280 285

Trp Gln Lys Leu Ser Gly Gly Gly His His His His His His
 290 295 300

<210> 12
 <211> 322
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 12

Met Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val
 1 5 10 15

Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu
 20 25 30

Gln Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His

35

40

45

Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asn Gly Lys Asp Asp Leu
 50 55 60

Leu Gly Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp
 65 70 75 80

Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys
 85 90 95

Gln Lys Ile Ile Phe Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala
 100 105 110

Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe
 115 120 125

Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met
 130 135 140

Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val
 145 150 155 160

Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp
 165 170 175

Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr
 180 185 190

Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp
 195 200 205

Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala
 210 215 220

Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu
 225 230 235 240

Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val
 245 250 255

Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val
 260 265 270

Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu
 275 280 285

Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser
 290 295 300

Gly Lys Asp Ile Trp Gln Lys Leu Ser Gly Gly Gly His His His His
 305 310 315 320

His His

<210> 13

<211> 320

<212> PRT

<213> Streptococcus pyogenes

<400> 13

Met Asp Ser Phe Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr
 1 5 10 15

Pro Tyr His Val Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Ala
 20 25 30

Asn Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala Asn
 35 40 45

Gln Gly Trp Tyr Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp Leu
 50 55 60

Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp
 65 70 75 80

Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu Lys
 85 90 95

Gln Lys Ile Asn Phe Asn Gly Glu Gln Met Phe Asp Val Lys Glu Ala
 100 105 110

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

Lys Glu Lys Ala Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val Phe
 130 135 140

Pro Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser Leu
 145 150 155 160

Thr Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro Arg
 165 170 175

Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Ser Lys Leu
 180 185 190

Leu Thr Ser Arg His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile Ser
 195 200 205

Asp Leu Ile Lys Lys Glu Leu Thr Glu Gly Lys Ala Leu Gly Leu Ser
 210 215 220

His Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp Gly
 225 230 235 240

Ala Asp Phe Asp Ser Asn Gly Asn Leu Lys Ala Ile Tyr Val Thr Asp
 245 250 255

Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Val
 260 265 270

Asn Ser Ala Gly Lys Val Ala Ile Ser Ala Lys Glu Ile Lys Glu Asp
 275 280 285

Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly Gln
 290 295 300

Asp Ser Trp Asn Gln Thr Asn Gly Gly Gly His His His His His
 305 310 315 320

<210> 14

<211> 325

<212> PRT

<213> Streptococcus equi ssp. Zooepidemicus

<400> 14

Met Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val
 1 5 10 15

Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr
 20 25 30

Pro Glu Gln Phe Arg Tyr Asn Asn Glu Asp Val Ile His Ala Pro Tyr
 35 40 45

Leu Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys
 50 55 60

Asp Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp
 65 70 75 80

Trp Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His
 85 90 95

Pro Glu Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu
 100 105 110

Lys Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe
 115 120 125

Asn Tyr Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu
 130 135 140

Gly Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr
 145 150 155 160

Leu Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln
 165 170 175

Asp Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly
 180 185 190

Asp Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly
 195 200 205

Leu Asn Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg
 210 215 220

Ala Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val
 225 230 235 240

Ile Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala
 245 250 255

Ile Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys
 260 265 270

Tyr Phe Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys
 275 280 285

Lys Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr
 290 295 300

Leu Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser Gly Gly Gly His
 305 310 315 320

His His His His His

325

<210> 15
 <211> 20
 <212> PRT
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 15

Asp	Asp	Tyr	Gln	Arg	Asn	Ala	Thr	Glu	Ala	Tyr	Ala	Lys	Glu	Val	Pro
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His	Gln	Ile	Thr
	20		

<210> 16
 <211> 969
 <212> DNA
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 16

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atccatgcgc catatcttgc tcatcaaggc tggtagcata tcaccaaggc cttcgatggg	180
aaggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat	240
caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt	300
tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc	360
aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa	420
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tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat	780

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gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900
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caccactaa 969

<210> 17
<211> 969
<212> DNA
<213> Streptococcus equi ssp. Zooepidemicus

<400> 17
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atccatgcgc catatcttgc tcatcaaggc tggtagcata tcaccaaggc cttcgatggg 180
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aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420
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attttcgatg ctgttttcac cagaggaaac cagacaacgc tcttgacagc tcgtcatgat 600
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tgaggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780
gctaatacgct ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840
gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900
acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 960
caccactaa 969

<210> 18
 <211> 969
 <212> DNA
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 18
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 atccatgcgc catatcttgc tcatcaaggc tggtagcata tcaccaaggc cttcaatggg 180
 aaggatgatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240
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 tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360
 aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420
 ctcgggggta tgcctgatct tgttctagat atgtttatca atggttacta cttaaagtgt 480
 tttaaaacac agtctactga tgtcaatcga cttatcagg acaaggacaa acgaggtggt 540
 attttcgatg ctgttttcac cagaggaaac cagacaacgc tcttgacagc tcgtcatgat 600
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 agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720
 tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780
 gctaatacgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840
 gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900
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<210> 19
 <211> 942
 <212> DNA
 <213> Streptococcus equi ssp. Zooepidemicus

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atccatgcg catatcttgc tcatcaaggc tggtagata tcaccaaggc cttcaatggg 180
 aaggatgatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240
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 aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420
 ctcgggggta tgcctgatct tggttctagat atgtttatca atggttacta cttaaattgtg 480
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 attttcgatg ctgttttcac cagaggaaac cagacaacgc tcttgacagc tcgtcatgat 600
 ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 660
 agagcccctg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720
 tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780
 gctaatacgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840
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<210> 20
 <211> 909
 <212> DNA
 <213> Streptococcus equi ssp. Zooepidemicus

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 aaggatgatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 180
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 tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 720
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<210> 21

<211> 969

<212> DNA

<213> Streptococcus equi ssp. Zooepidemicus

<400> 21

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 atccatgcgc catatcttgc tcatcaaggc tggtagata tcaccaaggc cttcaatggg 180
 aaggatgatc tcttgggtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240
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 tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360
 aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420
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 agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720
 tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780

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gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900
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caccactaa 969

<210> 22
<211> 963
<212> DNA
<213> Streptococcus pyogenes

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tttcacgctc cttatgttgc taaccaagga tggatatgata ttaccaaacc attcaatgga 180
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gatagtaaatt tatttgaata ttttaaagaa aaagctttcc cttatctatc tactaaacac 420
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taa 963

<210> 23
 <211> 978
 <212> DNA
 <213> Streptococcus equi ssp. Zooepidemicus

<400> 23
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 gaagatgtga tccatgcgcc atatcttgct catcaaggct ggtacgatat caccaaggcc 180
 ttcgatggga aggataatct cttgtgtggc gcagcaacgg caggtaatat gctgcattgg 240
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 aaaatcattt ttaacaacca agagctattt gatttgaaag ctgctatcga taccaaggac 360
 agtcaaacca atagtcagct ttttaattat tttagagata aagcctttcc aaatctatca 420
 gcacgtcaac tcgggggttat gcctgatctt gttctagata tgtttatcaa tggttactac 480
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