

376247-018
SEQUENCE LISTING

<110> LIANG, Jack
BORUP, Birthe
MITCHELL, Vesna
MUNDORFF, Emily
LALONDE, James
HUISMAN, Gjal't

<120> KETOREDUCTASE POLYPEPTIDES AND USES THEREOF

<130> 376247-018

<141> 2008-09-26

<150> 60/976,345

<150> 2007-09-28

<160> 139

<210> 1

<211> 762

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon Optimized L. Brevis Sequence

<400> 1

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tccgatgtag gtgaaaaggc cgccaaatca gtaggcactc cggatcagat tcagtttttt 180
cagcacgatt catccgatga agatggctgg acgaaactgt tcgacgccac cgagaaagca 240
ttcggcccgg ttagcacctt agtgaacaat gcagggattg cagttaacaa aagcgttgaa 300
gaaactacca cggccgaatg gcgtaaactg ctggccggtta atctggatgg tgtttttttc 360
ggcaccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgagggggt cgtaggcgat ccgagcctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggctat atcaagacct cgctggctga tgatctgccg 600
ggtgctgagg aagcgatgtc acagcgtagc aaaaccccta tgggccacat tggcgaaccg 660
aatgacatcg catatatctg tgtgtacctg gcattcaatg aatcgaaatt tgcgacgggt 720
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<210> 2

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Translation of Codon Optimized L. Brevis Sequence

<400> 2

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Met Ser Asn Arg Leu Asp Gly Lys Val Ala Ile Ile Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Thr Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Met Ile Thr Gly Arg His Ser Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Val Gly Thr Pro Asp Gln Ile Gln Phe Phe Gln His Asp Ser
50     55     60
Ser Asp Glu Asp Gly Trp Thr Lys Leu Phe Asp Ala Thr Glu Lys Ala
65     70     75     80
Phe Gly Pro Val Ser Thr Leu Val Asn Asn Ala Gly Ile Ala Val Asn
85     90     95
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Lys Ser Val Glu Glu Thr Thr Thr Ala Glu Trp Arg Lys Leu Leu Ala
100 105 110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115 120 125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140
Glu Gly Phe Val Gly Asp Pro Ser Leu Gly Ala Tyr Asn Ala Ser Lys
145 150 155 160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165 170 175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Tyr Ile Lys
180 185 190
Thr Pro Leu Val Asp Asp Leu Pro Gly Ala Glu Glu Ala Met Ser Gln
195 200 205
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210 215 220
Tyr Ile Cys Val Tyr Leu Ala Ser Asn Glu Ser Lys Phe Ala Thr Gly
225 230 235 240
Ser Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245 250

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<210> 3
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon Optimized L. Kefir Sequence

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<400> 3
atgaccgatc gtctgaaggg caaagtagcc atcgtaacgg gcgggactct gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccggtta atctggatgg tgtttttttc 360
ggcaccgcgc tgggcattca gcgcattgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgagggggt cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggctat atcaagaccc cgctgggtcga tgatctggaa 600
ggtgctgagg aaatgatgtc acagcgtacg aaaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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<210> 4
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Translation of Codon Optimized L. kefir Sequence

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<400> 4
Met Thr Asp Arg Leu Lys Gly Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20 25 30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35 40 45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50 55 60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65 70 75 80

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Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Ser
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Tyr Ile Lys
 180 185 190
 Thr Pro Leu Val Asp Asp Leu Glu Gly Ala Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 5
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 5
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 ttggcaatcg ccaccaaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgaca ctgatgttat tcgctttgtc 180
 cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttcggcccgg ttacgaccgt cgtgaacaat gcaggagatt gcgttttgaa aagcgtaaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
 ggcacccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
 gggttgggagg aaatgatgtc acagcgtagc gtaaccccta tgggccgcat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

<210> 6
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 6
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Met Gly Ile Gly Leu Ala Ile Ala Thr Lys Tyr Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Asp Thr Asp Val Ile Arg Phe Val Gln His Asp Val
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
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65      70      75      80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85      90      95
Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
240     245     250

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<210> 7
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

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<400> 7
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ttggcaatcg ccaccaaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgaca ctgatgttat tgcctttgtc 180
cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacgccac cgaggagacc 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcggtaaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgccg tgggcattca gcgcattgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccccta tgggccgcat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

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<210> 8
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

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<400> 8
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Met Gly Ile Gly Leu Ala Ile Ala Thr Lys Tyr Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Asp Thr Asp Val Ile Arg Phe Val Gln His Asp Val
50     55     60

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Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Ala Thr Glu Glu Thr
65 70 75 80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85 90 95
Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100 105 110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115 120 125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145 150 155 160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165 170 175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180 185 190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195 200 205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210 215 220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225 230 235 240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245 250

<210> 9
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 9
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ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctgatgttat tgcgtttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtcttttc 360
ggcaccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggtt ggttggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtatctccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 10
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 10
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15
Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
20 25 30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35 40 45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
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50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Ser Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 11
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 11
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 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctagtggtat tcgctttgtc 180
 cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttccggcccg ttacgaccgt cgtgaacaat gcaggaggtt gcgttttgaa aagcggtaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg cgtttttttc 360
 ggcacccgtc tgggcattca ggcgatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcgggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
 ggttgggagg aaatgatgtc acagcgtagg gtaaccctta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcactctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 12
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 12
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45

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

<210> 13
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 13
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 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgcca ctgatgttat tgcctttgtc 180
 cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttcgcccggt ttacgaccgt cgtgaacaat gcaggaggtt gcgttttgaa aagcgttaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tcagctggaa 600
 gggttggagg aaatgatgtc acagcgtagc gtaaccccta tgggccgcat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

<210> 14
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 14
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala

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35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
 65 70 75 80
 Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Gln Arg Leu Asp Gln Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 15
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 15
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 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggctcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttccggcccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcgttaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgtggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccggggccc atcaagacc agcggctcga tgagctggaa 600
 ggttgggagg aaatgatgtc acagcgtacg gtaaccctta tgggccgcat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

<210> 16
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 16
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
 20 25 30

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Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
 65 70 75 80
 Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 17
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 17
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacaat gggatcgggt 60
 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggctcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgagg ctgatgttat tcgctttgtc 180
 cagcagcatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttccggcccg ttacgaccgt cgtgaacaat gcaggagggt gcgttttgaa aagcgttaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtag gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc gtagtgctta tgggccgcat tggcgaaccg 660
 aatgacgtcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

<210> 18
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 18
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
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20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Val Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Val Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 19
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 19
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 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttccggcccg ttacgaccgt cgtgaacaat gcaggagatt gcgttttgaa aagcggtaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
 ggcacccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgtccctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tcagctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc gtaacccta tgggccgcat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

<210> 20
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 20
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15

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Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Ser Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Gln Arg Leu Asp Gln Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 21
 <211> 759
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Variant of L. kefir

<400> 21
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 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttcgggcccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcggttaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgta atctggatgg tgttttttc 360
 ggcacccgtc tgggcataca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgctgtgca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc gtaaccccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 22
 <211> 252
 <212> PRT
 <213> Artificial Sequence
 <220>
 <223> Variant of L. kefir

<400> 22
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
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1	Met	Gly	Ile	Gly	5	Leu	Ala	Ile	Ala	Asp	10	Lys	Tyr	Val	Glu	Glu	15	Gly	Ala
				20						25						30			
	Lys	Val	Val	Ile	Thr	Gly	Arg	His	Ala	Asp	Val	Gly	Glu	Lys	Ala	Ala			
			35					40							45				
	Lys	Ser	Ile	Gly	Gly	Thr	Asp	Val	Ile	Arg	Phe	Val	Gln	His	Asp	Val			
		50					55					60							
	Ser	Asp	Glu	Ala	Gly	Trp	Thr	Lys	Leu	Phe	Asp	Thr	Thr	Glu	Glu	Thr			
65					70						75						80		
	Phe	Gly	Pro	Val	Thr	Thr	Val	Val	Asn	Asn	Ala	Gly	Ser	Cys	Val	Leu			
				85					90						95				
	Lys	Ser	Val	Lys	Asp	Thr	Thr	Thr	Glu	Trp	Arg	Lys	Leu	Leu	Ser				
			100						105					110					
	Val	Asn	Leu	Asp	Gly	Val	Phe	Phe	Gly	Thr	Arg	Leu	Gly	Ile	Gln	Arg			
		115					120						125						
	Met	Lys	Asn	Lys	Gly	Leu	Gly	Ala	Ser	Ile	Ile	Asn	Met	Ser	Ser	Ile			
		130				135						140							
	Glu	Gly	Leu	Val	Gly	Asp	Pro	Thr	Leu	Gly	Ala	Tyr	Asn	Ala	Ser	Lys			
145					150						155					160			
	Gly	Ala	Val	Arg	Ile	Met	Ser	Lys	Ser	Ala	Ala	Leu	Asp	Cys	Ala	Leu			
				165						170					175				
	Lys	Asp	Tyr	Asp	Val	Arg	Val	Asn	Thr	Val	His	Pro	Gly	Pro	Ile	Lys			
			180						185					190					
	Thr	Pro	Arg	Leu	Asp	Asp	Leu	Glu	Gly	Trp	Glu	Glu	Met	Met	Ser	Gln			
		195					200						205						
	Arg	Thr	Val	Thr	Pro	Met	Gly	His	Ile	Gly	Glu	Pro	Asn	Asp	Ile	Ala			
		210				215						220							
	Trp	Ile	Cys	Val	Tyr	Leu	Ala	Ser	Asp	Glu	Ser	Lys	Phe	Ala	Thr	Gly			
225					230						235					240			
	Ala	Glu	Phe	Val	Val	Asp	Gly	Gly	Tyr	Thr	Ala	Gln							
				245					250										

<210> 23
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 23
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 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcggtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctgatgttat tgcgtttgtc 180
 cagcagcatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
 ttccggcccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcgttaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc gtaacccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 24
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 24

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Lys Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 25
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 25
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 ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcgctcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgagg ctgatgttat tcgctttgtc 180
 cagcagcatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttcggcccgg ttacgaccgt cgtgaacaat gcaggaggtt gcgttttgaa aagcgttaaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
 gggtgggagg aaatgatgtc acagcgtagc gtaacccta tgggccgcat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

<210> 26
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

376247-018

<400> 26

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
50      55      60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85      90      95
Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

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<210> 27

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 27

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atgaccgatc gtctgaagca taaagtagcc atcgtaacgg gcggggacaat gggatatcgg 60
ttggcaatcg ccgataaata cgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgagg ctgatgttat tcgctttgtc 180
cagcacgatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggagggt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgcgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcgggtac gtatcatgtc gaaaagcgca gcgctggatt gcgactgaa ggactacgat 540
gtgctgttca acacagtaca tccgggcccc atcaagaccc agcggctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccctta tgggccgcat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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<210> 28

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> variant of L. kefir

<400> 28

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Tyr Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
50      55      60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85      90      95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Gln Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

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<210> 29

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 29

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacaat gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tgcgtttgtc 180
cagcagcatg tctccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcgttaaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcggctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg gtaacccta tgggccgcat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

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<210> 30

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 30

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Val
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

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<210> 31

<211> 759

<212> DNA

<213> Artificial sequence

<220>

<223> Variant of L. kefir

<400> 31

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacaat gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttgt gcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggagacc 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
ggcaccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcgattc gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgttca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaattcg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 32

<211> 252

<212> PRT

<213> Artificial sequence

<220>

<223> Variant of L. kefir

<400> 32

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Val Arg Phe Val Gln His Asp Ala
50      55      60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
65      70      75      80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85      90      95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Ile Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

```

<210> 33

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 33

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atgaccgatac gtctgaagca taaagtagcc atcgtaaccg gcggggacaat gggatatcggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctgatgttgt gcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggagatt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccggtta atctggatgg tgtttttttc 360
ggcaccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggtt gattggcgat ccgacgctgg gggcgtaaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctgggtt gcgcactgaa ggactacgat 540
gtgctgtgca acacagtaca tccggggccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg ttaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 34

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 34

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Val Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Ile Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Val Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Leu Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

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<210> 35

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 35

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atgaccgatc gtctgaagca taaagtagcc atcgtaacccg gcggggacaat ggggtatcgggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaaag tagttattac tggtcggtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgaggc ctgatgttgt gcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggaggatt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggtt ggttggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg gtaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 36

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 36

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Met Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Val Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

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<210> 37

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 37

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcggt 60
ttggcaatcg ccgataaatt ttagaggag ggtgcgaaag tagttatcac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggagatt gcgttattaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaacta ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgta acacagtaca tccgggcccc atcaagacct agcggctcga tgagctggaa 600
ggttgggagg aaatgatgtc acagcgtacg gtaaccctta tgggccgcat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcactctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

```

<210> 38

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 38

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50      55      60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Ile
85      90      95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

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<210> 39

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 39

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctagatgtcat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttattaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca cgctggatt gcgcactgaa ggactacgat 540
gtgctgttca acacagtaca tccgggtccc atcaagaccc agcggctcga tgagctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcaacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 40

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 40

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50      55      60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Ile
85      90      95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

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<210> 41

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 41

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atgaccgatc gtctgaagca taaagtagcc atcgtaacgc gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgcca ctgatgttat tcgctttgtc 180
cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttattaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgcgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgttca acacagtaca tccgggcccc atcaagacct cgctgctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc aaaaccccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 42

<211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 42

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Ile
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

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<210> 43
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 43

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggtatcggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggggattg cagttgtgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
ggcaccgcgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600
ggtttgggagg aaatgatgtc acagcgtagc aaaaccccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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<210> 44
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 44
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Val
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 45
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 45
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 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttccggcccg ttacgaccgt cgtgaacaat gcagggattg cagttttaaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
 ggacaccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgtctga tgatctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc aaaaccctta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcactctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 46
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of *L. kefir*

<400> 46
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Leu
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 47
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of *L. kefir*

<400> 47
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcggt 60
 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcggtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgggc ctgatgttat tcgctttgtc 180
 cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttcgcccggg ttacgaccgt cgtgaacaat gcagggattg gagtttccaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgctgtgtc acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc aaaaccccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 48
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 48
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ile Gly Val Ser
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 49
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 49
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgggt 60
 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggctcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg catccgatga agtgggctgg acgaaaactgt tcgacaccac cgaggaggca 240
 ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcgttgaa 300
 gacactacca cggaggaatg gcataaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtaacatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagacct ctcggtcga tgatctggaa 600
 gggtgggagg aaatgatgtc acagcgtagc atcaccccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaattcg tggctgcacgg cgggtataacc gcacagtga

759

<210> 50
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 50
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Val Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp His Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Asn Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Ser Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Ile Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 51
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 51
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact ggggtatcgg 60
 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaa tagttattac tggctcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cgcacgatg cgtccgaaga agcaggctgg acgaaaactgt tcgacaccac cgaggaggca 240
 ttccggcccg ttacgaccgt cgtgaacaat gcaggggagt gcgagattaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
 ggcacccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcgggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc gtaaccctta tgggccgcat tggcgaaccg 660

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aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtataacc gcacagtga 759

<210> 52
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 52
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20 25 30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35 40 45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50 55 60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65 70 75 80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Glu Ile
85 90 95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100 105 110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115 120 125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145 150 155 160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165 170 175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180 185 190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195 200 205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210 215 220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225 230 235 240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245 250

<210> 53
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 53
atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatcgggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttattaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctatccgtta atctggatgg tgtttttttc 360
ggcaccgcc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat gcgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600

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ggttgggagg aaatgatgtc acagcgtacg gtaacccta tgggccgcat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtataacc gcacagtga 759

<210> 54
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 54
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20 25 30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35 40 45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50 55 60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65 70 75 80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Ile
85 90 95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100 105 110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115 120 125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140
Glu Gly Leu Val Gly Asp Ala Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145 150 155 160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165 170 175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180 185 190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195 200 205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210 215 220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225 230 235 240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245 250

<210> 55
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 55
atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcgatgttag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggaggtt gcgttattaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaaactg ctgtccgtta atctggatgg tgttttttc 360
ggcaccgcc ttggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

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gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tcagctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaacccta tgggccgcat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

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<210> 56
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 56

Met	Thr	Asp	Arg	Leu	Lys	His	Lys	Val	Ala	Ile	Val	Thr	Gly	Gly	Thr
1				5					10					15	
Leu	Gly	Ile	Gly	Leu	Ala	Ile	Ala	Asp	Lys	Phe	Val	Glu	Glu	Gly	Ala
			20					25					30		
Lys	Val	Val	Ile	Thr	Gly	Arg	His	Ala	Asp	Val	Gly	Glu	Lys	Ala	Ala
			35				40					45			
Lys	Ser	Ile	Gly	Gly	Thr	Asp	Val	Ile	Arg	Phe	Val	Gln	His	Asp	Ala
	50					55				60					
Ser	Glu	Glu	Ala	Gly	Trp	Thr	Lys	Leu	Phe	Asp	Thr	Thr	Glu	Glu	Ala
65					70				75					80	
Phe	Gly	Pro	Val	Thr	Thr	Val	Val	Asn	Asn	Ala	Gly	Ser	Cys	Val	Ile
				85				90					95		
Lys	Ser	Val	Glu	Asp	Thr	Thr	Thr	Glu	Glu	Trp	Arg	Lys	Leu	Leu	Ser
			100					105					110		
Val	Asn	Leu	Asp	Gly	Val	Phe	Phe	Gly	Thr	Arg	Leu	Gly	Ile	Gln	Arg
			115				120					125			
Met	Lys	Asn	Lys	Gly	Leu	Gly	Ala	Ser	Ile	Ile	Asn	Met	Ser	Ser	Ile
			130				135				140				
Glu	Gly	Leu	Val	Gly	Asp	Pro	Thr	Leu	Gly	Ala	Tyr	Asn	Ala	Ser	Lys
145					150					155					160
Gly	Ala	Val	Arg	Ile	Met	Ser	Lys	Ser	Ala	Ala	Leu	Asp	Cys	Ala	Leu
				165					170					175	
Lys	Asp	Tyr	Asp	Val	Arg	Val	Asn	Thr	Val	His	Pro	Gly	Pro	Ile	Lys
			180					185					190		
Thr	Gln	Arg	Leu	Asp	Gln	Leu	Glu	Gly	Trp	Glu	Glu	Met	Met	Ser	Gln
			195				200					205			
Arg	Thr	Val	Thr	Pro	Met	Gly	Arg	Ile	Gly	Glu	Pro	Asn	Asp	Ile	Ala
			210			215					220				
Trp	Ile	Cys	Val	Tyr	Leu	Ala	Ser	Asp	Glu	Ser	Lys	Phe	Ala	Thr	Gly
225					230					235					240
Ala	Glu	Phe	Val	Val	Asp	Gly	Gly	Tyr	Thr	Ala	Gln				
				245					250						

<210> 57
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 57

atgaccgatc	gtctgaagca	taaagtagcc	atcgtaaccg	gcgggacact	gggtatcggt	60
ttggcaatcg	ccgataaatt	tgtagaggag	ggtgcgaaag	tagttattac	tggtcgtcac	120
gcggatgtag	gtgaaaaggc	cgccaaatca	atcggcggca	ctgatgttat	tcgctttgtc	180
cagcacgatg	cgtccgaaga	agcaggctgg	acgaaactgt	tcgacaccac	cgaggaggca	240
ttcggccccg	ttacgaccgt	cgtgaacaat	gcaggagggt	gcgttattaa	aagcgttgaa	300
gacactacca	cggaggaatg	gcgtaaactg	ctgtccgtta	atctggatgg	tggttttttc	360
ggcaccgcc	tgggcattca	gcgcatgaaa	aataaaggct	tgggcgctag	catcatcaat	420
atgagcagta	ttgaggggct	cgtaggcgat	ccgacgctgg	gggcatacaa	cgcttccaag	480

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ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
ggttggggagg aaatgatgtc acagcgtacg gtaaccctta tgggccgcat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

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<210> 58
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 58

Met	Thr	Asp	Arg	Leu	Lys	His	Lys	Val	Ala	Ile	Val	Thr	Gly	Gly	Thr
1				5					10					15	
Leu	Gly	Ile	Gly	Leu	Ala	Ile	Ala	Asp	Lys	Phe	Val	Glu	Glu	Gly	Ala
			20					25					30		
Lys	Val	Val	Ile	Thr	Gly	Arg	His	Ala	Asp	Val	Gly	Glu	Lys	Ala	Ala
		35				40						45			
Lys	Ser	Ile	Gly	Gly	Thr	Asp	Val	Ile	Arg	Phe	Val	Gln	His	Asp	Ala
	50					55				60					
Ser	Glu	Glu	Ala	Gly	Trp	Thr	Lys	Leu	Phe	Asp	Thr	Thr	Glu	Glu	Ala
65					70				75					80	
Phe	Gly	Pro	Val	Thr	Thr	Val	Val	Asn	Asn	Ala	Gly	Ser	Cys	Val	Ile
			85					90					95		
Lys	Ser	Val	Glu	Asp	Thr	Thr	Thr	Glu	Glu	Trp	Arg	Lys	Leu	Leu	Ser
		100						105					110		
Val	Asn	Leu	Asp	Gly	Val	Phe	Phe	Gly	Thr	Arg	Leu	Gly	Ile	Gln	Arg
		115					120					125			
Met	Lys	Asn	Lys	Gly	Leu	Gly	Ala	Ser	Ile	Ile	Asn	Met	Ser	Ser	Ile
	130					135					140				
Glu	Gly	Leu	Val	Gly	Asp	Pro	Thr	Leu	Gly	Ala	Tyr	Asn	Ala	Ser	Lys
145					150				155						160
Gly	Ala	Val	Arg	Ile	Met	Ser	Lys	Ser	Ala	Ala	Leu	Asp	Cys	Ala	Leu
			165						170					175	
Lys	Asp	Tyr	Asp	Val	Arg	Val	Asn	Thr	Val	His	Pro	Gly	Pro	Ile	Lys
		180						185					190		
Thr	Gln	Arg	Leu	Asp	Glu	Leu	Glu	Gly	Trp	Glu	Glu	Met	Met	Ser	Gln
	195						200					205			
Arg	Thr	Val	Thr	Pro	Met	Gly	Arg	Ile	Gly	Glu	Pro	Asn	Asp	Ile	Ala
	210					215					220				
Trp	Ile	Cys	Val	Tyr	Leu	Ala	Ser	Asp	Glu	Ser	Lys	Phe	Ala	Thr	Gly
225					230					235					240
Ala	Glu	Phe	Val	Val	Asp	Gly	Gly	Tyr	Thr	Ala	Gln				
			245					250							

<210> 59
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 59

atgaccgatc	gtctgaagca	taaagtagcc	atcgtaaccg	gcgggacact	gggtatcggt	60
ttggcaatcg	ccgataaatt	tgtagaggag	ggtgcgaaaag	tagttattac	tggtcgtcac	120
gcggatgtag	gtgaaaaggc	cgccaaatca	atcggcgggca	ctgatgttat	tcgctttgtc	180
cagcagcatg	cgtccgaaga	agcaggctgg	acgaaactgt	tcgacaccac	cgaggaggca	240
ttcggccccg	ttacgaccgt	cgtgaacaat	gcaggggagtt	gcgttattaa	aagcgttgaa	300
gacactacca	cggaggaatg	gcgtaaactg	ctgtccgtta	atctggatgg	tgtttttttc	360
ggcaccgcc	tgggcattca	gcgcatgaaa	aataaaggct	tgggcgctag	catcatcaat	420

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atgagcagta ttgaggggct cgtaggcgat ccgtctctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccctta tgggcccgcg tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgac aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

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<210> 60
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> variant of L. kefir

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<400> 60
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50      55      60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Ile
85      90      95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Ser Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

```

<210> 61
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

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<400> 61
atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggcttg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttattca tagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360

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ggcaccgcc tgggcattca ggcgatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggggat cgcacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt ggcgactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgagctggaa 600
ggttgggagg aaatgatgtc acagcgtacg gtaaccacct tgggcccgcg tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgac aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg tgggtatacc gcacagtga 759

```

<210> 62
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

```

<400> 62
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50      55      60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ser Cys Val Ile
85      90      95
His Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Val Thr Pro Met Gly Arg Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

```

<210> 63
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

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<400> 63
atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaa tagttattac tggtcgtcac 120
cgggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tgcgtttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggagggt gcgttttgaa aagcgttgaa 300

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gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta tticaggggt cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg gtaacccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 64
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 64

```

Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Gln Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 65
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 65

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggtatcggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

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ttcggccccg ttacgaccgt cgtgaacaat gcagggattg ggcttgtgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag tatcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgtc acacagtaca tccgggcccc atcaagacct cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaacccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 66
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

```

<400> 66
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Gly Leu Val
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 67
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

```

<400> 67
atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

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cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttattaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccggtt atctggatgg tgttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgtc acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc ttaacccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgac aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 68
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

```

<400> 68
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Gly Val Ile
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Leu Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 69
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

```

<400> 69
atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatcgggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

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gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgtgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgcgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcgggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgtca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaacccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggctgacgg cgggtatacc gcacagtga 759

```

<210> 70
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

```

<400> 70
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ile Gly Val Val
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 71
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 71
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60

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```

ttggcaatcg ccgataaatt tgtagaggag ggtgCGaaag tagttattac tggTCgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tCGctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcgccccgg ttacgaccgt cgtgaacaat gcagggattg gggttgtgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgtcgtctg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgactgaa ggactacgat 540
gtgCGtgtca acacagtaca tccgggcccc atcaagaccc cgcggctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgac aatggaaatt tgcgacgggt 720
gcagaatttg tggTCgacgg cgggtatacc gcacagtga 759

```

<210> 72
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 72

Met	Thr	Asp	Arg	Leu	Lys	His	Lys	Val	Ala	Ile	Val	Thr	Gly	Gly	Thr	1	5	10	15
Leu	Gly	Ile	Gly	Leu	Ala	Ile	Ala	Asp	Lys	Phe	Val	Glu	Glu	Gly	Ala	20	25	30	
Lys	Val	Val	Ile	Thr	Gly	Arg	His	Ala	Asp	Val	Gly	Glu	Lys	Ala	Ala	35	40	45	
Lys	Ser	Ile	Gly	Gly	Thr	Asp	Val	Ile	Arg	Phe	Val	Gln	His	Asp	Ala	50	55	60	
Ser	Glu	Glu	Ala	Gly	Trp	Thr	Lys	Leu	Phe	Asp	Thr	Thr	Glu	Glu	Ala	65	70	75	80
Phe	Gly	Pro	Val	Thr	Val	Val	Asn	Asn	Ala	Gly	Ile	Gly	Val	Val		85	90	95	
Lys	Ser	Val	Glu	Asp	Thr	Thr	Thr	Glu	Trp	Arg	Lys	Leu	Leu	Ser		100	105	110	
Val	Asn	Leu	Asp	Gly	Val	Phe	Phe	Gly	Thr	Arg	Leu	Gly	Ile	Gln	Arg	115	120	125	
Met	Lys	Asn	Lys	Gly	Leu	Gly	Ala	Ser	Ile	Ile	Asn	Met	Ser	Ser	Ile	130	135	140	
Glu	Gly	Leu	Val	Gly	Asp	Pro	Ser	Leu	Gly	Ala	Tyr	Asn	Ala	Ser	Lys	145	150	155	160
Gly	Ala	Val	Arg	Ile	Met	Ser	Lys	Ser	Ala	Ala	Leu	Asp	Cys	Ala	Leu	165	170	175	
Lys	Asp	Tyr	Asp	Val	Arg	Val	Asn	Thr	Val	His	Pro	Gly	Pro	Ile	Lys	180	185	190	
Thr	Pro	Arg	Leu	Asp	Asp	Leu	Glu	Gly	Trp	Glu	Glu	Met	Met	Ser	Gln	195	200	205	
Arg	Thr	Val	Thr	Pro	Met	Gly	His	Ile	Gly	Glu	Pro	Asn	Asp	Ile	Ala	210	215	220	
Trp	Ile	Cys	Val	Tyr	Leu	Ala	Ser	Asp	Glu	Trp	Lys	Phe	Ala	Thr	Gly	225	230	235	240
Ala	Glu	Phe	Val	Val	Asp	Gly	Gly	Tyr	Thr	Ala	Gln					245	250		

<210> 73
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 73

376247-018

```

atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatcgggt 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcggtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tgcgtttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggagggt 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttgtgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgttca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc acaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattcgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 74
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 74

Met	Thr	Asp	Arg	Leu	Lys	His	Lys	Val	Ala	Ile	Val	Thr	Gly	Gly	Thr
1				5					10					15	
Leu	Gly	Ile	Gly	Leu	Ala	Ile	Ala	Asp	Lys	Phe	Val	Glu	Glu	Gly	Ala
			20					25					30		
Lys	Val	Val	Ile	Thr	Gly	Arg	His	Ala	Asp	Val	Gly	Glu	Lys	Ala	Ala
		35					40					45			
Lys	Ser	Ile	Gly	Gly	Thr	Asp	Val	Ile	Arg	Phe	Val	Gln	His	Asp	Ala
	50					55					60				
Ser	Glu	Glu	Ala	Gly	Trp	Thr	Lys	Leu	Phe	Asp	Thr	Thr	Glu	Glu	Val
65					70					75				80	
Phe	Gly	Pro	Val	Thr	Val	Val	Asn	Asn	Ala	Gly	Ser	Cys	Val	Val	
			85				90					95			
Lys	Ser	Val	Glu	Asp	Thr	Thr	Thr	Glu	Glu	Trp	Arg	Lys	Leu	Leu	Ser
		100					105						110		
Val	Asn	Leu	Asp	Gly	Val	Phe	Phe	Gly	Thr	Arg	Leu	Gly	Ile	Gln	Arg
		115					120					125			
Met	Lys	Asn	Lys	Gly	Leu	Gly	Ala	Ser	Ile	Ile	Asn	Met	Ser	Ser	Ile
	130					135					140				
Glu	Gly	Leu	Val	Gly	Asp	Pro	Thr	Leu	Gly	Ala	Tyr	Asn	Ala	Ser	Lys
145					150					155				160	
Gly	Ala	Val	Arg	Ile	Met	Ser	Lys	Ser	Ala	Ala	Leu	Asp	Cys	Ala	Leu
			165						170					175	
Lys	Asp	Tyr	Asp	Val	Arg	Val	Asn	Thr	Val	His	Pro	Gly	Pro	Ile	Lys
		180						185					190		
Thr	Pro	Arg	Leu	Asp	Asp	Leu	Glu	Gly	Trp	Glu	Glu	Met	Met	Ser	Gln
		195					200					205			
Arg	Thr	Thr	Thr	Pro	Met	Gly	His	Ile	Gly	Glu	Pro	Asn	Asp	Ile	Ala
	210					215					220				
Trp	Ile	Cys	Val	Tyr	Leu	Ala	Ser	Asp	Glu	Ser	Lys	Phe	Ala	Thr	Gly
225					230					235				240	
Ala	Glu	Phe	Val	Val	Asp	Gly	Gly	Tyr	Thr	Ala	Gln				
			245						250						

<210> 75
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 75

```

atgaccgatac gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgaaga agcaggctgg acgaaactgt tcgacaccac cgaggagggt 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggattt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
ggcaccgctc tgggcattca gcgcataaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg ttaacccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcactctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 76

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 76

```

Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Glu Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Val
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Leu Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 77

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 77

```

atgaccgatc gtctgaagca taaagtagcc atcgtaaccc gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggctcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggcccgg ttacgaccgt cgtgaacaat gcaggaggtt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcataaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtaacatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgatctggaa 600
ggttgggagg aaatgatgtc gcagcgtagc gtaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcacttgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 78

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 78

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp His Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Asn Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Gln Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 79

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 79

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atgaccgatc gtctgaagca taaagtagcc atcgtaacgc gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt ttagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggagatt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgita atctggatgg tgttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgtca acacagtaca tccgggcccc atcaagaccc agcggctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggacctg tgtgtacctg gcattctgac aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 80

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 80

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Gln Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Thr Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 81

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 81

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggagggt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtagggcat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccgggcccc atcaagacct agcggctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg gtaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgac aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 82

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 82

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Gln Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 83

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 83

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggagtt gcgttttgaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcgggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgca acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc gtaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 84

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 84

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 85

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 85

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcggtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttacaaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgcgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgtgtc acacagtaca tccgggcccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc aaaacccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgac aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 86

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 86

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50      55      60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
85      90      95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250

```

<210> 87

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 87

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atgaccgatac gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt ttagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tgcctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tgcacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggattg cagttacaaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
ggcaccgcgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgactgaa ggactacgat 540
gtgcgtgtca acacagtaca tccggggccc atcaagaccc cgcggtcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg ataacccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcacttgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 88

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 88

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Ile Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

```

<210> 89

<211> 759

<212> DNA

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 89

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atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcagggattg cagttacaaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttt 360
ggcaccctgc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgttca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

```

<210> 90

<211> 252

<212> PRT

<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 90

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Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20     25     30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35     40     45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50     55     60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65     70     75     80
Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
85     90     95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100    105    110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115    120    125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130    135    140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145    150    155    160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165    170    175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180    185    190
Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195    200    205
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210    215    220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225    230    235    240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245    250

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<210> 91

<211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 91
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 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcggtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttcggcccggt ttacgaccgt cgtgaacaat gcagggattg cagttacaaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcgggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgctgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600
 ggttgggagg aaatgatgtc acagcgtagc aaaaccctta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtggacc gcacagtga 759

<210> 92
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 92
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Trp Thr Ala Gln
 245 250

<210> 93
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 93
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttcggccccg ttacgaccgt cgtgaacaat gcagggattg cagttacaaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
 ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtag gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgctgtgta acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600
 gggtgggagg aaatgatgtc acagcgtacg gttaccctta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 94
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 94
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Leu Leu Asp Asp Leu Glu Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 95
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

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<400> 95
atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcggtcac 120
gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
ttcggccccg ttacgaccgt cgtgaacaat gcaggggattg cagttacaaa aagcgttgaa 300
gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
ggcaccgctc tgggcattca gcgcattgaaa aataaaggct tgggcgctag catcatcaat 420
atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
gtgctgttca acacagtaca tccgggcccc atcaagaccc cggtatctcga tgatctggaa 600
ggttgggagg aaatgatgtc acagcgtagc aaaaccctta tgggccacat tggcgaaccg 660
aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759
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<210> 96
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

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<400> 96
Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
1      5      10      15
Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35      40      45
Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50      55      60
Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
65      70      75      80
Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
85      90      95
Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
100     105     110
Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
115     120     125
Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130     135     140
Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
145     150     155     160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
165     170     175
Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
180     185     190
Thr Pro Asp Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
195     200     205
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
210     215     220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
225     230     235     240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
245     250
```

<210> 97
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of *L. kefir*

<400> 97
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatcgggt 60
 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttccggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttacaaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcgggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc tgcggctcga tgatctggaa 600
 ggtttgggagg aaatgatgtc acagcgtagc aaaaccctta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcacttgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 98
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of *L. kefir*

<400> 98
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Leu Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln

<210> 99
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 99
 atgaccgatc gtctgaagca taaagtagcc atcgtaacccg gcgggacact gggatcgggt 60
 ttggcaatcg ccgataaatt ttagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcagcatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttccggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttacaaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttttggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600
 gggttgggagg aaatgatgtc acagcgtagc aaaaccccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 100
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 100
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Leu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240

Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250 376247-018

<210> 101
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 101
 atgaccgatac gtctgaagca taaagtagcc atcgttaaccg gcgggacact gggatatcgg 60
 ttggcaatcg ccgataaatt ttagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcgga ctgatgttat tcgctttgtc 180
 cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttccggcccg ttacgaccgt cgtgaacaat gcagggttg cagttacaaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360
 ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggtgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgactgaa ggactacgat 540
 gtgctgttca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600
 ggttgggagg aaatgatgtc acagcgtacg attacccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcacttgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 102
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 102
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Thr
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Leu Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Ile Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
 210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 Page 52

225 230 235 240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln

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<210> 103
<211> 759
<212> DNA
<213> Artificial Sequence
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<220>
<223> variant of L. kefir

<400> 103						
atgaccgatc	gtctgaagca	taaagtagcc	atcgtaacccg	gcgggacact	gggtatcggt	60
ttggcaatcg	ccgataaatt	tgtagaggag	gggtgcgaaag	tagttattac	tggtcgtcac	120
gcggatgtag	gtgaaaaggc	cgccaaatca	atcgcgcgca	ctgatgttat	tcgctttgtc	180
cagcacgatg	cgtccgatga	agcaggcttg	acgaaactgt	tcgacaccac	cgaggaggca	240
ttcggcccg	ttacgacccg	cgtgaacaat	gcagggaattt	gcgttattaa	aagcgttgaa	300
gacactacca	cggaggaattg	gcgtaaactg	ctgtccgtta	atctggatgg	tgtttttttc	360
ggcaccgcgc	tgggcattca	gcgcattgaa	aataaaggct	tgggcgctag	catcatcaat	420
atgagcagta	ttgaggggct	cgtaggcgat	ccgacgctgg	gggcatacaa	cgcttccaag	480
ggggcggtag	gtatcatgtc	gaaaagcgca	gcgcctggatt	gcgcactgaa	ggactacgat	540
gtgcgtgtca	acacagtaca	tccgggcccc	atcaagacc	cgcggtctga	tgatctggaa	600
ggttgggag	aatgatgtc	acagcgtag	acaaccctta	tgggccacat	tggcgaaccg	660
aatgacatcg	catgtactctg	tgtgtacctg	gcattctgacg	aatcgaaatt	tgcgacgggt	720
qcagaatttg	tggctcgacg	cgggtatacc	gcacagtga			759

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<210> 104
<211> 252
<212> PRT
<213> Artificial sequence
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<220>
<223> variant of L. kefir

<400>	104															
Met	Thr	Asp	Arg	Leu	Lys	His	Lys	Val	Ala	Ile	Val	Thr	Gly	Gly	Thr	
1				5					10					15		
Leu	Gly	Ile	Gly	Leu	Ala	Ile	Ala	Asp	Lys	Phe	Val	Glu	Glu	Gly	Ala	
			20					25					30			
Lys	Val	Val	Ile	Thr	Gly	Arg	His	Ala	Asp	Val	Gly	Glu	Lys	Ala	Ala	
		35					40					45				
Lys	Ser	Ile	Gly	Gly	Thr	Asp	Val	Ile	Arg	Phe	Val	Gln	His	Asp	Ala	
	50					55					60					
Ser	Asp	Glu	Ala	Gly	Trp	Thr	Lys	Leu	Phe	Asp	Thr	Thr	Glu	Glu	Ala	
65					70					75					80	
Phe	Gly	Pro	Val	Thr	Val	Val	Asn	Asn	Ala	Gly	Ile	Cys	Val	Ile		
				85				90					95			
Lys	Ser	Val	Glu	Asp	Thr	Thr	Thr	Glu	Glu	Trp	Arg	Lys	Leu	Leu	Ser	
			100					105					110			
Val	Asn	Leu	Asp	Gly	Val	Phe	Phe	Gly	Thr	Arg	Leu	Gly	Ile	Gln	Arg	
		115					120					125				
Met	Lys	Asn	Lys	Gly	Leu	Gly	Ala	Ser	Ile	Ile	Asn	Met	Ser	Ser	Ile	
	130					135					140					
Glu	Gly	Leu	Val	Gly	Asp	Pro	Thr	Leu	Gly	Ala	Tyr	Asn	Ala	Ser	Lys	
145					150					155				160		
Gly	Ala	Val	Arg	Ile	Met	Ser	Lys	Ser	Ala	Ala	Leu	Asp	Cys	Ala	Leu	
				165					170					175		
Lys	Asp	Tyr	Asp	Val	Arg	Val	Asn	Thr	Val	His	Pro	Gly	Pro	Ile	Lys	
			180					185					190			
Thr	Pro	Arg	Leu	Asp	Asp	Leu	Glu	Gly	Trp	Glu	Glu	Met	Met	Ser	Gln	
		195					200					205				
Arg	Thr	Thr	Thr	Pro	Met	Gly	His	Ile	Gly	Glu	Pro	Asn	Asp	Ile	Ala	
	210					215					220					

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Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 105
 <211> 759
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Variant of L. kefir

<400> 105
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact ggggtatcggt 60
 ttggcaatcg ccgataaatt ttagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tgcgtttgtc 180
 cagcagcatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggtt 240
 ttccggcccgg ttacgaccgt cgtgaacaat gcagggattg cgggtgtgtaa aagcgttgaa 300
 gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgctc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcgctctcga tgatctggaa 600
 gggttgggagg aaatgatgtc acagcgtagc gtaaccccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 106
 <211> 252
 <212> PRT
 <213> Artificial Sequence
 <220>
 <223> Variant of L. kefir

<400> 106
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Val
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Cys
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Arg Leu Asp Asp Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205
 Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala

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210 215 220
 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
 245 250

<210> 107
 <211> 759
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 107
 atgaccgatc gtctgaagca taaagtagcc atcgtaaccg gcgggacact gggatatcgg 60
 ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120
 gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180
 cagcacgatg cgtccgatga agtgggctgg acgaaactgt tcgacaccac cgaggaggca 240
 ttcgccccgg ttacgaccgt cgtgaacaat gcagggagtt gcgttttaaa aagcgttgaa 300
 gacactacca cggaggaatg gcataaactg ctgtccgtta atctggatgg tgtttttttc 360
 ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420
 atgagcagta ttgaggggct tgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480
 ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactttgat 540
 gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgcggtctga tgagctggaa 600
 gggtgggagg aaatgatgtc acagcgtagc gtaaccccta tgggccacat tggcgaaccg 660
 aatgacatcg catggatctg tgtgtacctg gcattctgacg aatcgaaatt tgcgacgggt 720
 gcagaatttg tggtcgacgg cgggtataacc gcacagtga 759

<210> 108
 <211> 252
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Variant of L. kefir

<400> 108
 Met Thr Asp Arg Leu Lys His Lys Val Ala Ile Val Thr Gly Gly Thr
 1 5 10 15
 Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
 20 25 30
 Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
 35 40 45
 Lys Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Val Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
 65 70 75 80
 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ser Cys Val Leu
 85 90 95
 Lys Ser Val Glu Asp Thr Thr Thr Glu Trp His Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Phe Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Pro Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln
 195 200 205

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Arg Thr Val Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
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 Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
 225 230 235 240
 Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
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 Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Thr
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 85 90 95
 Lys Ser Val Lys Asp Thr Thr Thr Glu Glu Trp Arg Lys Leu Leu Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
 115 120 125
 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
 130 135 140
 Glu Gly Leu Val Gly Asp Pro Thr Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
 165 170 175
 Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Pro Ile Lys
 180 185 190
 Thr Gln Arg Leu Asp Glu Leu Glu Gly Trp Glu Glu Met Met Ser Gln

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Trp	Ile	Cys	Val	Tyr	Leu	Ala	Ser	Asp	Glu	Ser	Lys	Phe	Ala	Thr	Gly			
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Lys	Val	Met	Ile	Thr	Gly	Arg	His	Xaa	Asp	Val	Gly	Glu	Lys	Ala	Ala
		35				40					45				
Lys	Ser	Val	Gly	Xaa	Pro	Asp	Gln	Xaa	Gln	Phe	Phe	Gln	His	Asp	Xaa
		50				55				60					
Ser	Xaa	Glu	Xaa	Gly	Trp	Thr	Xaa	Leu	Phe	Asp	Xaa	Thr	Glu	Lys	Xaa
				70					75					80	
Phe	Gly	Pro	Val	Ser	Thr	Leu	Val	Asn	Asn	Ala	Gly	Xaa	Xaa	Xaa	Xaa
				85				90					95		
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Val	Asn	Leu	Asp	Gly	Val	Phe	Phe	Gly	Thr	Arg	Leu	Gly	Ile	Gln	Arg
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Lys Asp Xaa Asp Val Arg Val Asn Thr Val His Pro Gly Xaa Ile Lys
      180      185      190
Thr Xaa Xaa Xaa Asp Xaa Leu Pro Gly Xaa Glu Glu Ala Met Ser Gln
      195      200      205
Arg Xaa Xaa Xaa Pro Met Gly Xaa Ile Gly Glu Pro Asn Asp Xaa Ala
      210      215      220
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		20						25				30			
Lys	Val	Val	Ile	Thr	Gly	Arg	His	Xaa	Asp	Val	Gly	Glu	Lys	Ala	Ala

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Lys Ser 35 Ile Gly Xaa Thr Asp 40 Val Xaa Arg Phe Val 45 Gln His Asp Xaa
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 Ser Xaa Glu Xaa Gly Trp Thr Xaa Leu Phe Asp Xaa Thr Glu Glu Xaa
 65 70 75 80
 Phe Gly Pro Val Thr Val Val Asn Asn Ala Gly Xaa Xaa Xaa Xaa
 85 90 95
 Xaa Ser Val Xaa Asp Thr Thr Thr Glu Glu Trp Xaa Lys Leu Xaa Ser
 100 105 110
 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
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 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Xaa Asn Met Ser Ser Ile
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 Xaa Gly Xaa Xaa Gly Asp Xaa Xaa Leu Gly Ala Tyr Asn Ala Ser Lys
 145 150 155 160
 Gly Ala Xaa Arg Xaa Met Ser Lys Ser Ala Ala Leu Xaa Cys Ala Leu
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 Lys Asp Xaa Asp Val Arg Val Asn Thr Val His Pro Gly Xaa Ile Lys
 180 185 190
 Thr Xaa Xaa Xaa Xaa Xaa Leu Glu Gly Xaa Glu Glu Met Met Ser Gln
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 Arg Xaa Xaa Xaa Pro Met Gly Xaa Ile Gly Glu Pro Asn Asp Xaa Ala
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 Arg Ser Ile Gly Gly Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
 50 55 60
 Ser Asp Glu Thr Gly Trp Thr Lys Leu Phe Asp Thr Thr Glu Glu Ala
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 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Ser

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Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
      130      135      140
Glu Gly Phe Val Gly Asp Pro Ala Leu Gly Ala Tyr Asn Ala Ser Lys
      145      150      155      160
Gly Ala Val Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Leu
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Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Tyr Ile Lys
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      195      200      205
Arg Thr Lys Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Ile Ala
      210      215      220
Trp Ile Cys Val Tyr Leu Ala Ser Asp Glu Ser Lys Phe Ala Thr Gly
      225      230      235      240
Ala Glu Phe Val Val Asp Gly Gly Tyr Thr Ala Gln
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 <213> Artificial Sequence

<220>
 <223> The adh from *Aspergillus flavus*

```

<400> 116
Met Ser Ile Pro Glu Met Gln Trp Ala Gln Val Ala Glu Gln Lys Gly
1      5      10      15
Gly Pro Leu Ile Tyr Lys Gln Ile Pro Val Pro Lys Pro Gly Pro Asp
20     25     30
Glu Ile Leu Val Lys Val Arg Tyr Ser Gly Val Cys His Thr Asp Leu
35     40     45

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His Ala Leu Lys Gly Asp Trp Pro Leu Pro Val Lys Met Pro Leu Val
 50 55 60
 Gly Gly His Glu Gly Ala Gly Val Val Val Ala Arg Gly Asp Leu Val
 65 70 75 80
 Thr Glu Phe Glu Ile Gly Asp His Ala Gly Leu Lys Trp Leu Asn Gly
 85 90 95
 Ser Cys Leu Ala Cys Glu Phe Cys Lys Gln Ala Asp Glu Pro Leu Cys
 100 105 110
 Pro Asn Ala Ser Leu Ser Gly Tyr Thr Val Asp Gly Thr Phe Gln Gln
 115 120 125
 Tyr Ala Ile Gly Lys Ala Thr His Ala Ser Lys Leu Pro Lys Asn Val
 130 135 140
 Pro Leu Asp Ala Val Ala Pro Val Leu Cys Ala Gly Ile Thr Val Tyr
 145 150 155 160
 Lys Gly Leu Lys Glu Ser Gly Val Arg Pro Gly Gln Thr Val Ala Ile
 165 170 175
 Val Gly Ala Gly Gly Gly Leu Gly Ser Leu Ala Leu Gln Tyr Ala Lys
 180 185 190
 Ala Met Gly Ile Arg Val Val Ala Ile Asp Gly Gly Glu Lys Gln
 195 200 205
 Ala Met Cys Glu Gln Leu Gly Ala Glu Ala Tyr Val Asp Phe Thr Lys
 210 215 220
 Thr Gln Asp Leu Val Ala Asp Val Lys Ala Ala Thr Pro Glu Gly Leu
 225 230 235 240
 Gly Ala His Ala Val Ile Leu Leu Ala Val Ala Glu Lys Pro Phe Gln
 245 250 255
 Gln Ala Ala Glu Tyr Val Ser Arg Gly Thr Val Val Ala Ile Gly Leu
 260 265 270
 Pro Ala Gly Ala Phe Leu Arg Ala Pro Val Phe Asn Thr Val Val Arg
 275 280 285
 Met Ile Asn Ile Lys Gly Ser Tyr Val Gly Asn Arg Gln Asp Gly Val
 290 295 300
 Glu Ala Val Asp Phe Phe Ala Arg Gly Leu Ile Lys Ala Pro Phe Lys
 305 310 315 320
 Thr Ala Pro Leu Gln Asp Leu Pro Lys Ile Phe Glu Leu Met Glu Gln
 325 330 335
 Gly Lys Ile Ala Gly Arg Tyr Val Leu Glu Ile Pro Glu
 340 345

<210> 117

<211> 729

<212> DNA

<213> Artificial sequence

<220>

<223> Codon optimized version of the adh gene from *Oenococcus oeni*

<400> 117

atgtttgatc gcctgaaggg taagggtggcg atcgtcaccg gcggtaatag cgggtattggt 60
 aaggcaatcg cggcagactt catcgccgag ggcgcgaaag tagtgattac cggtcgcaac 120
 caagagaagg gtcgccagac tgcgctggaa atcgccgggtg acattctgtt cattcagcag 180
 gacgtgagcc aggaggcgga ctggcagaaa gttatctcca aaaccatcga gaagttcggg 240
 aagtttgata ttctggttaa caacgctggc gtcggcgggc tgggtaagcc actggcagaa 300
 atgtccctgt ctgaattcaa ttggacccaa tccattaatc tgtccggtaa cttcctgggt 360
 attcacttcg cgctgaacaa aatgaccgaa cctggtagca ttattgacgt aagcagcgcg 420
 gctggcctgc gtggttttcc gggcgagcc gattatagcg ctcccaaagg tggtagcgcg 480
 ctgctgacgc gcgccgcggc gctggaagcg ctgcaaatgg gtaaaaagat ccgtgtaaac 540
 tctattcacc caggttggat tgataccgat atcgtaacaa aagatatgcg tgagcaggtt 600
 atcgcatga cccctatgca tcacctgggc caaccgaaag atattgcaa gctggcgacg 660
 tatctggcat ctgacgagtc cgagtatact acgggctccg aactggcagc cgacggcggt 720
 ctgatggca 729

<210> 118

<211> 243

<212> PRT

<213> Artificial Sequence

<220>

<223> The adh from *Oenococcus oeni*

<400> 118

```

Met Phe Asp Arg Leu Lys Gly Lys Val Ala Ile Val Thr Gly Gly Asn
1      5      10      15
Ser Gly Ile Gly Lys Ala Ile Ala Asp Phe Ile Ala Glu Gly Ala
20      25      30
Lys Val Val Ile Thr Gly Arg Asn Gln Glu Lys Gly Arg Gln Thr Ala
35      40      45
Leu Glu Ile Ala Gly Asp Ile Leu Phe Ile Gln Gln Asp Val Ser Gln
50      55      60
Glu Ala Asp Trp Gln Lys Val Ile Ser Lys Thr Ile Glu Lys Phe Gly
65      70      75      80
Lys Phe Asp Ile Leu Val Asn Asn Ala Gly Val Gly Gly Val Gly Lys
85      90      95
Pro Leu Ala Glu Met Ser Leu Ser Glu Phe Asn Trp Thr Gln Ser Ile
100     105     110
Asn Leu Ser Gly Asn Phe Leu Gly Ile His Phe Ala Leu Asn Lys Met
115     120     125
Thr Glu Pro Gly Ser Ile Ile Asp Val Ser Ser Ala Ala Gly Leu Arg
130     135     140
Gly Phe Pro Gly Ala Ala Asp Tyr Ser Ala Ser Lys Gly Gly Thr Arg
145     150     155     160
Leu Leu Thr Arg Ala Ala Ala Leu Glu Ala Leu Gln Met Gly Lys Lys
165     170     175
Ile Arg Val Asn Ser Ile His Pro Gly Trp Ile Asp Thr Asp Ile Val
180     185     190
Pro Lys Asp Met Arg Glu Gln Val Ile Ala Met Thr Pro Met His His
195     200     205
Leu Gly Gln Pro Lys Asp Ile Ala Lys Leu Ala Thr Tyr Leu Ala Ser
210     215     220
Asp Glu Ser Glu Tyr Thr Thr Gly Ser Glu Leu Ala Ala Asp Gly Gly
225     230     235     240
Leu Met Ala

```

<210> 119

<211> 768

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimized version of the adh gene from *Ralstonia eutropha*

<400> 119

```

atgcagggca aaattgcact ggttacgggc ggtgcgtctg gtatgggtct ggccttcacc 60
cgtcgcctgg cccaagaagg cgcacgtggt tacttcaccg acattaacgg cgccgcgggt 120
cacgcgacgg aaagcgagct gcagggtgct ggtctggcgg tcgtattcct gcgtcatgac 180
gtgacccagg aaaacgactg gctgcgcgtc ctggaacata ttggcgtgtg tgacggtcgc 240
ctggatgtac tggatgaataa tgccggcatt gcgatttctc acaacattga gacttgtact 300
actgaggatt ttgatcgcac gctgaatggt aacctgaagt ccgtgtttct gggctgcaaa 360
cacggtctgg ctctgatgaa acagaagggt ggcagcatca ttaacgtag ctctatcacc 420
gcgatttgcg gcgaacctgt ggcgctggcg tatagcgcta gcaaagccgg cgtccgtttt 480
ctgagcaagt ctgttgccct gcattgtgcg gagaagggtc acgccatccg tggttaacagc 540
ctgcaccggg gttacattga taccgcgtg ctggcaggca gcaacgcggg tggctccctg 600
accgctgacg aggtaacgcg gagccgtgta cgtattggcg gtgaaattcc gctgaaacgt 660
cgcggcaccc cggacgaagt tgcaggcgcg gttctgtacc tggctagcga tgaatccacc 720
tatgttactg gtactgagct ggtaattgat ggcggctacg catgtcat 768

```

<210> 120

<211> 256

<212> PRT

<213> Artificial Sequence

<220>

<223> The adh from *Ralstonia eutropha*

<400> 120

```

Met Gln Gly Lys Ile Ala Leu Val Thr Gly Gly Ala Ser Gly Met Gly
1      5      10      15
Leu Ala Phe Thr Arg Arg Leu Ala Gln Glu Gly Ala Arg Val Tyr Phe
20      25      30
Thr Asp Ile Asn Gly Ala Ala Gly His Ala Thr Glu Ser Glu Leu Gln
35      40      45
Gly Ala Gly Leu Ala Val Val Phe Leu Arg His Asp Val Thr Gln Glu
50      55      60
Asn Asp Trp Leu Arg Val Leu Glu His Ile Gly Ala Val Asp Gly Arg
65      70      75      80
Leu Asp Val Leu Val Asn Asn Ala Gly Ile Ala Ile Ser His Asn Ile
85      90      95
Glu Thr Cys Thr Thr Glu Asp Phe Asp Arg Thr Leu Asn Val Asn Leu
100     105     110
Lys Ser Val Phe Leu Gly Cys Lys His Gly Leu Ala Leu Met Lys Gln
115     120     125
Lys Gly Gly Ser Ile Ile Asn Val Ser Ser Ile Thr Ala Ile Cys Gly
130     135     140
Glu Pro Val Ala Leu Ala Tyr Ser Ala Ser Lys Ala Gly Val Arg Phe
145     150     155     160
Leu Ser Lys Ser Val Ala Leu His Cys Ala Glu Lys Gly Tyr Ala Ile
165     170     175
Arg Val Asn Ser Leu His Pro Gly Tyr Ile Asp Thr Pro Leu Leu Ala
180     185     190
Gly Ser Asn Ala Gly Gly Ser Leu Thr Ala Asp Glu Val Thr Ala Ser
195     200     205
Arg Val Arg Ile Gly Gly Glu Ile Pro Leu Lys Arg Arg Gly Thr Pro
210     215     220
Asp Glu Val Ala Gly Ala Val Leu Tyr Leu Ala Ser Asp Glu Ser Thr
225     230     235     240
Tyr Val Thr Gly Thr Glu Leu Val Ile Asp Gly Gly Tyr Ala Cys His
245     250     255

```

<210> 121

<211> 939

<212> DNA

<213> Artificial Sequence

<220>

<223> YDL ADH from *Saccharomyces cerevisiae*

<400> 121

```

atgtcttttc accaacagtt tttcacgctg aacaacggca ataaaatccc ggcgattgcc 60
atcatcgggc ctggtacacg ttggtataaa aatgaagaaa ctgacgcgac cttctccaat 120
agtctggttg aacaaatcgt gtatgcgttg aaactgccgg ggattatcca catcgacgcc 180
gcggagattt atcgcaccta cccggaagtg ggtaaagcac tgtccctgac cgaaaagcct 240
cgtaacgcga tttttctgac ggataaatat tctccgcaga ttaaaatgag tgactcccct 300
gcggacggtc tggatttagc attgaagaaa atgggtacag attatgttga tttatatctg 360
ttacattccc cgtttgtttc gaaggaagtg aatggcttaa gcttagaaga ggcttggaag 420
gatattggagc agttatacaa aagtggtaaa gctaaaaaca tcgggggttc caatttcgca 480
gtggaagacc tgcaacgtat cctgaagtc gctgaagtta aacctcaggt caaccagatt 540
gagttctctc cgttcctgca aaaccaaaca ccaggcattt ataaattctg tcaggagcac 600
gatatcctgg tggaaacata ttctccgctg ggcccgcctg agaagaaaac cgcgaggat 660
gacagccaac cattttttga gtacgtcaaa gaattgagcg aaaaatacat caaatccgag 720
gcccagatca tcctgcgctg ggtcactaaa cgcggtgtgc tgccagttac cacctcttca 780
aagcctcagc gcattagcga tgctcagaac ctgttttctt tcgacctgac agcggaagag 840
gttgataaaa tcacggagct gggctctgga catgaaccgc tgcgcctgta ctggaataaa 900
ttgtatggca aatataacta cgccgcccag aaagtgttaa 939

```

<210> 122
 <211> 312
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> YDL ADH from *Saccharomyces cerevisiae*

<400> 122
 Met Ser Phe His Gln Gln Phe Phe Thr Leu Asn Asn Gly Asn Lys Ile
 1 5 10 15
 Pro Ala Ile Ala Ile Ile Gly Thr Gly Thr Arg Trp Tyr Lys Asn Glu
 20 25 30
 Glu Thr Asp Ala Thr Phe Ser Asn Ser Leu Val Glu Gln Ile Val Tyr
 35 40 45
 Ala Leu Lys Leu Pro Gly Ile Ile His Ile Asp Ala Ala Glu Ile Tyr
 50 55 60
 Arg Thr Tyr Pro Glu Val Gly Lys Ala Leu Ser Leu Thr Glu Lys Pro
 65 70 75 80
 Arg Asn Ala Ile Phe Leu Thr Asp Lys Tyr Ser Pro Gln Ile Lys Met
 85 90 95
 Ser Asp Ser Pro Ala Asp Gly Leu Asp Leu Ala Leu Lys Lys Met Gly
 100 105 110
 Thr Asp Tyr Val Asp Leu Tyr Leu Leu His Ser Pro Phe Val Ser Lys
 115 120 125
 Glu Val Asn Gly Leu Ser Leu Glu Glu Ala Trp Lys Asp Met Glu Gln
 130 135 140
 Leu Tyr Lys Ser Gly Lys Ala Lys Asn Ile Gly Val Ser Asn Phe Ala
 145 150 155 160
 Val Glu Asp Leu Gln Arg Ile Leu Lys Val Ala Glu Val Lys Pro Gln
 165 170 175
 Val Asn Gln Ile Glu Phe Ser Pro Phe Leu Gln Asn Gln Thr Pro Gly
 180 185 190
 Ile Tyr Lys Phe Cys Gln Glu His Asp Ile Leu Val Glu Ala Tyr Ser
 195 200 205
 Pro Leu Gly Pro Leu Gln Lys Lys Thr Ala Gln Asp Asp Ser Gln Pro
 210 215 220
 Phe Phe Glu Tyr Val Lys Glu Leu Ser Glu Lys Tyr Ile Lys Ser Glu
 225 230 235 240
 Ala Gln Ile Ile Leu Arg Trp Val Thr Lys Arg Gly Val Leu Pro Val
 245 250 255
 Thr Thr Ser Ser Lys Pro Gln Arg Ile Ser Asp Ala Gln Asn Leu Phe
 260 265 270
 Ser Phe Asp Leu Thr Ala Glu Glu Val Asp Lys Ile Thr Glu Leu Gly
 275 280 285
 Leu Glu His Glu Pro Leu Arg Leu Tyr Trp Asn Lys Leu Tyr Gly Lys
 290 295 300
 Tyr Asn Tyr Ala Ala Gln Lys Val
 305 310

<210> 123
 <211> 1047
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> ADH from *Rhodococcus erythropolis*

<400> 123
 atgaaagcca ttacgtacac tcgtatcggt gcggaaccag aactgactga aatcccgaag 60
 ccggaaccgg gcccgggcga agtactgctg gaagtcacgg cagctggcgt gtgccattcc 120
 gatgatttca ttatgtctct gccggaagaa cagtacacct acggcctgcc gctgaccctg 180
 ggtcatgaag gtgctggtaa agttgccgca gttggcgaag gtgttgaagg gttggatatt 240
 ggcaccaatg tggttgtgta cggcccatgg ggttgtggca actgttggca ttgcagtcag 300
 ggccctggaga actattgctc ccgtgcgcag gaactgggta ttaaccgcc tggctctggg 360
 gctccggggg ctttggcaga atttatgatt gtcgactcac cacgtcattt ggtcccgaatt 420

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ggcgatttag accctgttaa aactgttccg ttgactgatg cgggcctgac cccataccat 480
gcaatcaaac gctccctgcc gaaactgcgc ggcggtctct atgcagtagt gatcggtacg 540
ggtggcctgg gccacgtggc tatccaactg ctgcgtcatt tatctgctgc aacggtgatc 600
gccttgacg tttctgccga taaactggaa ctggctacca aagtcggcgc acatgaagta 660
gtcctgtctg ataaagatgc agcggagaat gtgcgtaaaa ttactggtag ccaaggtgca 720
gctttggtgt tggattttgt gggctatcag cctaccattg acaccgcat ggcagtggcg 780
ggcgtgggct ctgacgtcac cattgttggg atcgggtgatg gccaggcaca tgcgaaagt 840
ggtttcttcc agagtcctta tgaggcatcg gttacggtac cttattgggg cgctcgaat 900
gaactgatcg aattgatcga tctggcgcat gctggtatct tcgacattgc cgttgagacc 960
ttctctttgg ataatggtgc agaggcctat cgtcgcctgg ctgcgggcac actgtcaggc 1020
cgtgcggtag tcgtcccggg cctgtaa 1047

```

<210> 124

<211> 348

<212> PRT

<213> Artificial Sequence

<220>

<223> ADH from Rhodococcus erythropolis

<400> 124

```

Met Lys Ala Ile Gln Tyr Thr Arg Ile Gly Ala Glu Pro Glu Leu Thr
1      5      10      15
Glu Ile Pro Lys Pro Glu Pro Gly Pro Gly Glu Val Leu Leu Glu Val
      20      25      30
Thr Ala Ala Gly Val Cys His Ser Asp Asp Phe Ile Met Ser Leu Pro
      35      40      45
Glu Glu Gln Tyr Thr Tyr Gly Leu Pro Leu Thr Leu Gly His Glu Gly
      50      55      60
Ala Gly Lys Val Ala Ala Val Gly Glu Gly Val Glu Gly Leu Asp Ile
      65      70      75      80
Gly Thr Asn Val Val Val Tyr Gly Pro Trp Gly Cys Gly Asn Cys Trp
      85      90      95
His Cys Ser Gln Gly Leu Glu Asn Tyr Cys Ser Arg Ala Gln Glu Leu
      100      105      110
Gly Ile Asn Pro Pro Gly Leu Gly Ala Pro Gly Ala Leu Ala Glu Phe
      115      120      125
Met Ile Val Asp Ser Pro Arg His Leu Val Pro Ile Gly Asp Leu Asp
      130      135      140
Pro Val Lys Thr Val Pro Leu Thr Asp Ala Gly Leu Thr Pro Tyr His
      145      150      155      160
Ala Ile Lys Arg Ser Leu Pro Lys Leu Arg Gly Gly Ser Tyr Ala Val
      165      170      175
Val Ile Gly Thr Gly Gly Leu Gly His Val Ala Ile Gln Leu Leu Arg
      180      185      190
His Leu Ser Ala Ala Thr Val Ile Ala Leu Asp Val Ser Ala Asp Lys
      195      200      205
Leu Glu Leu Ala Thr Lys Val Gly Ala His Glu Val Val Leu Ser Asp
      210      215      220
Lys Asp Ala Ala Glu Asn Val Arg Lys Ile Thr Gly Ser Gln Gly Ala
      225      230      235      240
Ala Leu Val Leu Asp Phe Val Gly Tyr Gln Pro Thr Ile Asp Thr Ala
      245      250      255
Met Ala Val Ala Gly Val Gly Ser Asp Val Thr Ile Val Gly Ile Gly
      260      265      270
Asp Gly Gln Ala His Ala Lys Val Gly Phe Phe Gln Ser Pro Tyr Glu
      275      280      285
Ala Ser Val Thr Val Pro Tyr Trp Gly Ala Arg Asn Glu Leu Ile Glu
      290      295      300
Leu Ile Asp Leu Ala His Ala Gly Ile Phe Asp Ile Ala Val Glu Thr
      305      310      315      320
Phe Ser Leu Asp Asn Gly Ala Glu Ala Tyr Arg Arg Leu Ala Ala Gly
      325      330      335
Thr Leu Ser Gly Arg Ala Val Val Val Pro Gly Leu
      340      345

```

<210> 125
 <211> 1047
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> YGL ADH from *Saccharomyces cerevisiae*

<400> 125
 atgaccacgg aaaaaaccgt agtggttcgtg tcaggcgcgga ccggttttat tgctctgcac 60
 gtggttagatg acctgctgaa aactgggttac aaagtaattg gttccgggtcg ttctcaggaa 120
 aaaaatgacg gtttgctgaa gaagttcaag tccaaccgga atctgagcat ggaaattgtg 180
 gaagatattg cggcaccaaa cgcttcgat aaagtattcc agaaacatgg taaagaaatt 240
 aaagtgggtcc tgcataatcgc gtccccgggtc catttcaaca ctaccgattt cgaaaaaagac 300
 ttactgatcc cggcggtaaa cgggtaccaa tctattttgg aagcaattaa gaactatgcc 360
 gcagacaccg tggaaaaagt ggttattact tcatctgttg ccgcttggc ctctccgggt 420
 gatatgaaag ataccagctt cgtgggttaac gaagaatcct ggaataaaga cacctgggaa 480
 tcgtgtcagg cgaatgctgt gtccgcttat tgcggttcta aaaaattcgc agagaaaacg 540
 gcgtgggact tcttgaaga aaaccagagc agcattaaat ttactctgtc cacgattaac 600
 ccaggcttcg tttttgggtcc gcagctgttc gccgactcct tgcgcaatgg tattaactct 660
 agcagtgcga ttattgcgaa cctgggtgtcg tataaattag gggataactt ctacaattat 720
 agcggccccgt ttatcgacgt ccgtgacgtt tccaaagctc atctgctggc atttgagaaa 780
 cctgaatgcg ccggtcagcg cctgtttctg tgcgaggata tgttctgttc ccaggaagcc 840
 ctggacattc tgaacgaaga atttccacag ctgaagggca agatcgcaac gggcgaacct 900
 ggcagcggct cgaccttcct gactaaaaat tgttgcaaat gcgacaatcg taaaactaaa 960
 aacttgctgg gcttccagtt caacaaattc cgcgactgca ttgtcgatac tgcgtcccg 1020
 ttgttggaag tgcaaagcaa aagctaa 1047

<210> 126
 <211> 348
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> YGL ADH from *Saccharomyces cerevisiae*

<400> 126
 Met Thr Thr Glu Lys Thr Val Val Phe Val Ser Gly Ala Thr Gly Phe
 1 5 10 15
 Ile Ala Leu His Val Val Asp Asp Leu Leu Lys Thr Gly Tyr Lys Val
 20 25 30
 Ile Gly Ser Gly Arg Ser Gln Glu Lys Asn Asp Gly Leu Leu Lys Lys
 35 40 45
 Phe Lys Ser Asn Pro Asn Leu Ser Met Glu Ile Val Glu Asp Ile Ala
 50 55 60
 Ala Pro Asn Ala Phe Asp Lys Val Phe Gln Lys His Gly Lys Glu Ile
 65 70 75 80
 Lys Val Val Leu His Ile Ala Ser Pro Val His Phe Asn Thr Thr Asp
 85 90 95
 Phe Glu Lys Asp Leu Leu Ile Pro Ala Val Asn Gly Thr Lys Ser Ile
 100 105 110
 Leu Glu Ala Ile Lys Asn Tyr Ala Ala Asp Thr Val Glu Lys Val Val
 115 120 125
 Ile Thr Ser Ser Val Ala Ala Leu Ala Ser Pro Gly Asp Met Lys Asp
 130 135 140
 Thr Ser Phe Val Val Asn Glu Glu Ser Trp Asn Lys Asp Thr Trp Glu
 145 150 155 160
 Ser Cys Gln Ala Asn Ala Val Ser Ala Tyr Cys Gly Ser Lys Lys Phe
 165 170 175
 Ala Glu Lys Thr Ala Trp Asp Phe Leu Glu Glu Asn Gln Ser Ser Ile
 180 185 190
 Lys Phe Thr Leu Ser Thr Ile Asn Pro Gly Phe Val Phe Gly Pro Gln
 195 200 205
 Leu Phe Ala Asp Ser Leu Arg Asn Gly Ile Asn Ser Ser Ser Ala Ile
 210 215 220
 Ile Ala Asn Leu Val Ser Tyr Lys Leu Gly Asp Asn Phe Tyr Asn Tyr
 225 230 235 240

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Ser Gly Pro Phe Ile Asp Val Arg Asp Val Ser Lys Ala His Leu Leu
 245 250 255
 Ala Phe Glu Lys Pro Glu Cys Ala Gly Gln Arg Leu Phe Leu Cys Glu
 260 265 270
 Asp Met Phe Cys Ser Gln Glu Ala Leu Asp Ile Leu Asn Glu Glu Phe
 275 280 285
 Pro Gln Leu Lys Gly Lys Ile Ala Thr Gly Glu Pro Gly Ser Gly Ser
 290 295 300
 Thr Phe Leu Thr Lys Asn Cys Cys Lys Cys Asp Asn Arg Lys Thr Lys
 305 310 315 320
 Asn Leu Leu Gly Phe Gln Phe Asn Lys Phe Arg Asp Cys Ile Val Asp
 325 330 335
 Thr Ala Ser Gln Leu Leu Glu Val Gln Ser Lys Ser
 340 345

<210> 127

<211> 939

<212> DNA

<213> Artificial Sequence

<220>

<223> YPR ADH from *Saccharomyces cerevisiae*

<400> 127

atgccggcaa cgtaaataaa cagcagtgct accttaaaat taaacacagg tgcgagcatt 60
 cctgtcctgg ggttcggcac ctggcgctct gtcgataaca acggctatca tagtgtaatt 120
 gcggcgctga aagcggggta ccgtcatatc gatgctgcgg ccatctatct gaatgaagaa 180
 gaagtcggcc gtgcgatcaa ggactccggt gtccctcgtg aagaaatttt tattaccacc 240
 aaactgtggg gcaccgaaca acgcgatcca gaagcagccc tgaacaaatc tctgaaacgt 300
 ctgggtctgg actatgtgga cctgtatctg atgcactggc cggcccctct gaaaacagac 360
 cgtgtaactg acggtaacgt cctgtgcatc ccgacctgg aagatggcac cgtggacatc 420
 gataccaaag agtgggaattt tattaaaacc tgggaactga tgcaggaatt gccgaaaact 480
 ggtaagacca aagccgtcgg tgtgtccaat ttttccatca acaatatcaa agaactgctg 540
 gaatcgccaa ataacaaggc cgttccagca accaatcaga tcgagattca tccgttgctg 600
 ccgcaggatg aattaatcgc cttttgtaaa gaaaaaggca ttgtggtcga agcatatagc 660
 ccattcggct ccgctaacgc ccgcgtgctg aaagaacagg cgattatcga tatggccaaa 720
 aagcacggcg tcgaaccggc gcaactgatt atcagctggg cgattcagcg cggttatgtg 780
 gtattggcca agtccgtaaa tccggagcgt atcgtgtcga actttaagat ttttaccctg 840
 ccagaggatg atttcaaac catctctaac ctgagcaaag tgcacgggtac caaacgtgtc 900
 gttgacatga aatggggctc atttccgatt tttcaataa 939

<210> 128

<211> 312

<212> PRT

<213> Artificial Sequence

<220>

<223> YPR ADH from *Saccharomyces cerevisiae*

<400> 128

Met Pro Ala Thr Leu Lys Asn Ser Ser Ala Thr Leu Lys Leu Asn Thr
 1 5 10 15
 Gly Ala Ser Ile Pro Val Leu Gly Phe Gly Thr Trp Arg Ser Val Asp
 20 25 30
 Asn Asn Gly Tyr His Ser Val Ile Ala Ala Leu Lys Ala Gly Tyr Arg
 35 40 45
 His Ile Asp Ala Ala Ala Ile Tyr Leu Asn Glu Glu Val Gly Arg
 50 55 60
 Ala Ile Lys Asp Ser Gly Val Pro Arg Glu Glu Ile Phe Ile Thr Thr
 65 70 75 80
 Lys Leu Trp Gly Thr Glu Gln Arg Asp Pro Glu Ala Ala Leu Asn Lys
 85 90 95
 Ser Leu Lys Arg Leu Gly Leu Asp Tyr Val Asp Leu Tyr Leu Met His
 100 105 110
 Trp Pro Val Pro Leu Lys Thr Asp Arg Val Thr Asp Gly Asn Val Leu
 115 120 125

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

<210> 129
 <211> 1029
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> GRE ADH from *Saccharomyces cerevisiae*

<400> 129
 atgtctgtgt tcgtgtcagg cgcgaaatggg ttatttgctc agcacatcgt agatctgctg 60
 ctgaaagaag attacaaagt aattgggttcc gcacgttctc aggaaaaagc tgaaaatttg 120
 accgaagcct tcggtaacaa cccgaaatgt agcatggaag tgggtgcctga tattagcaaa 180
 ctggatgcct tcgatcatgt attccagaaa catggtaaaag atattaaaat cgtcctgcat 240
 accgcgtccc cgttttgttt cgatattacc gattccgaac gtgacttact gatcccggtg 300
 gtaaacggtg tcaaaggtat ttgacacagt attaagaaat atgccgcaga cagcgtggaa 360
 cgctgtggtt tgacttcac ttacgccgcg gtatttgata tggcgaagga aaacgataag 420
 agcctgacct tcaacgaaga atcctggaat ccggcgacct ggggaatcgtg tcagagtgtg 480
 ccggtgaacg cttattgctg ttctaaaaaa ttgcgcagaga aagcagcgtg ggaattcttg 540
 gaagaaaacc gtgatagcgt gaaatttgag ctgacagcgg tcaaccaggt ttacgttttt 600
 ggtccgcaga tgttcgataa agatgttaaa aaacacttga acaccagctg cgaactggtg 660
 aactctctga tgcattctgag ccctgaagat aaaattccgg aactgttttg cggttacatc 720
 gacgtccgtg acgttgcgaa agctcatctg gttgcatttc agaaacgtga aacaatcggg 780
 cagcgcctga tcgtgtcgga ggcacgtttc acgatgcagg acgttctgga cattctgaac 840
 gaagactttc cagtactgaa gggcaatatc ccggtcgga agcctggcag cggcgccacc 900
 cataatactc tgggcgccac cctggacaat aaaaaagca aaaaattgct gggcttcaaa 960
 ttccgtaatc tgaaagagac tattgacgat actgcgtccc agatcctgaa attcgaaggt 1020
 cgcatthaa 1029

<210> 130
 <211> 342
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> GRE ADH from *Saccharomyces cerevisiae*

<400> 130
 Met Ser Val Phe Val Ser Gly Ala Asn Gly Phe Ile Ala Gln His Ile
 1 5 10 15
 Val Asp Leu Leu Leu Lys Glu Asp Tyr Lys Val Ile Gly Ser Ala Arg
 20 25 30

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Ser Gln Glu Lys Ala Glu Asn Leu Thr Glu Ala Phe Gly Asn Asn Pro
 35 40 45
 Lys Phe Ser Met Glu Val Val Pro Asp Ile Ser Lys Leu Asp Ala Phe
 50 55 60
 Asp His Val Phe Gln Lys His Gly Lys Asp Ile Lys Ile Val Leu His
 65 70 75 80
 Thr Ala Ser Pro Phe Cys Phe Asp Ile Thr Asp Ser Glu Arg Asp Leu
 85 90 95
 Leu Ile Pro Ala Val Asn Gly Val Lys Gly Ile Leu His Ser Ile Lys
 100 105 110
 Lys Tyr Ala Ala Asp Ser Val Glu Arg Val Val Leu Thr Ser Ser Tyr
 115 120 125
 Ala Ala Val Phe Asp Met Ala Lys Glu Asn Asp Lys Ser Leu Thr Phe
 130 135 140
 Asn Glu Glu Ser Trp Asn Pro Ala Thr Trp Glu Ser Cys Gln Ser Asp
 145 150 155 160
 Pro Val Asn Ala Tyr Cys Gly Ser Lys Lys Phe Ala Glu Lys Ala Ala
 165 170 175
 Trp Glu Phe Leu Glu Glu Asn Arg Asp Ser Val Lys Phe Glu Leu Thr
 180 185 190
 Ala Val Asn Pro Val Tyr Val Phe Gly Pro Gln Met Phe Asp Lys Asp
 195 200 205
 Val Lys Lys His Leu Asn Thr Ser Cys Glu Leu Val Asn Ser Leu Met
 210 215 220
 His Leu Ser Pro Glu Asp Lys Ile Pro Glu Leu Phe Gly Gly Tyr Ile
 225 230 235 240
 Asp Val Arg Asp Val Ala Lys Ala His Leu Val Ala Phe Gln Lys Arg
 245 250 255
 Glu Thr Ile Gly Gln Arg Leu Ile Val Ser Glu Ala Arg Phe Thr Met
 260 265 270
 Gln Asp Val Leu Asp Ile Leu Asn Glu Asp Phe Pro Val Leu Lys Gly
 275 280 285
 Asn Ile Pro Val Gly Lys Pro Gly Ser Gly Ala Thr His Asn Thr Leu
 290 295 300
 Gly Ala Thr Leu Asp Asn Lys Lys Ser Lys Lys Leu Leu Gly Phe Lys
 305 310 315 320
 Phe Arg Asn Leu Lys Glu Thr Ile Asp Asp Thr Ala Ser Gln Ile Leu
 325 330 335
 Lys Phe Glu Gly Arg Ile
 340

<210> 131
 <211> 1032
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon optimized ADH from *S. salmonicolor*

<400> 131
 atggcaaaga tcgacaacgc agttctgccc gaggggttctc tgggtgctggt caccggcgcg 60
 aacggctttg tcgctagcca tgtgggtcgaa caactgctgg aacacggcta taagggtgcg 120
 ggcactgctc gctctgcctc caaactggcg aacctgcaga aacgttggga cgccaaatac 180
 cctgggtcgtt tcgagactgc cgttgttgaa gacatgctga agcagggtgc atatgatgaa 240
 gttattaaag gcgcggcagg tgtcgcacac atcgcgtccg tggtcagctt ttctaacaaa 300
 tatgatgagg tggtaactcc tgcgatcggg ggcacgctga atgccctgcg tgccgcagct 360
 gctacgcctt ccgtgaaacg ttttgtgctg accagcagca ctgtttctgc actgattcca 420
 aaacctaacg tcgaaggtat ttatctggat gagaagagct ggaacctgga aagcattgat 480
 aaggctaaaa ccctgcctga atctgatccg cagaaaagcc tgtgggtcta cgccgcaagc 540
 aaaacggaag cggaactggc tgcctggaaa ttcattggacg aaaacaaacc gcactttact 600
 ctgaatgccg ttctgccaaa ctacactatc ggtaccattt ttgaccacaga aacccaatcc 660
 ggttccactt ccggctggat gatgtctctg ttcaatggcg aagtatctcc ggcactggcg 720
 ctgatgccgc cgcagtacta tgtctctgca gttgatatcg gtctgctgca cctgggttgt 780
 ctggttctgc cgcaaactga acgccgtcgt gtttacggca ccgcaggcac ctttgattgg 840
 aacaccgttc tggcgacctt ccgtaaactt tatccgtcca agacgttccc ggctgacttt 900
 ccggatcagg gccaggatct gtccaaattt gataccgccc cgagcctgga gattctgaaa 960
 tccctgggccc gccctggctg gcgtagcatc gaggaatcta tcaaagatct ggtgggttcc 1020

gagaccgcct aa

<210> 132
 <211> 343
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> ADH from *S. salmonicolor*

<400> 132
 Met Ala Lys Ile Asp Asn Ala Val Leu Pro Glu Gly Ser Leu Val Leu
 1 5 10 15
 Val Thr Gly Ala Asn Gly Phe Val Ala Ser His Val Val Glu Gln Leu
 20 25 30
 Leu Glu His Gly Tyr Lys Val Arg Gly Thr Ala Arg Ser Ala Ser Lys
 35 40 45
 Leu Ala Asn Leu Gln Lys Arg Trp Asp Ala Lys Tyr Pro Gly Arg Phe
 50 55 60
 Glu Thr Ala Val Val Glu Asp Met Leu Lys Gln Gly Ala Tyr Asp Glu
 65 70 75 80
 Val Ile Lys Gly Ala Ala Gly Val Ala His Ile Ala Ser Val Val Ser
 85 90 95
 Phe Ser Asn Lys Tyr Asp Glu Val Val Thr Pro Ala Ile Gly Gly Thr
 100 105 110
 Leu Asn Ala Leu Arg Ala Ala Ala Thr Pro Ser Val Lys Arg Phe
 115 120 125
 Val Leu Thr Ser Ser Thr Val Ser Ala Leu Ile Pro Lys Pro Asn Val
 130 135 140
 Glu Gly Ile Tyr Leu Asp Glu Lys Ser Trp Asn Leu Glu Ser Ile Asp
 145 150 155 160
 Lys Ala Lys Thr Leu Pro Glu Ser Asp Pro Gln Lys Ser Leu Trp Val
 165 170 175
 Tyr Ala Ala Ser Lys Thr Glu Ala Glu Leu Ala Ala Trp Lys Phe Met
 180 185 190
 Asp Glu Asn Lys Pro His Phe Thr Leu Asn Ala Val Leu Pro Asn Tyr
 195 200 205
 Thr Ile Gly Thr Ile Phe Asp Pro Glu Thr Gln Ser Gly Ser Thr Ser
 210 215 220
 Gly Trp Met Met Ser Leu Phe Asn Gly Glu Val Ser Pro Ala Leu Ala
 225 230 235 240
 Leu Met Pro Pro Gln Tyr Tyr Val Ser Ala Val Asp Ile Gly Leu Leu
 245 250 255
 His Leu Gly Cys Leu Val Leu Pro Gln Ile Glu Arg Arg Arg Val Tyr
 260 265 270
 Gly Thr Ala Gly Thr Phe Asp Trp Asn Thr Val Leu Ala Thr Phe Arg
 275 280 285
 Lys Leu Tyr Pro Ser Lys Thr Phe Pro Ala Asp Phe Pro Asp Gln Gly
 290 295 300
 Gln Asp Leu Ser Lys Phe Asp Thr Ala Pro Ser Leu Glu Ile Leu Lys
 305 310 315 320
 Ser Leu Gly Arg Pro Gly Trp Arg Ser Ile Glu Glu Ser Ile Lys Asp
 325 330 335
 Leu Val Gly Ser Glu Thr Ala
 340

<210> 133
 <211> 1041
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon optimized ADH from *S. coelicolor*

<400> 133
 atgaaggcac tgcagtaccg caccatcggc gccccgcccc aggtcgtcac cgtcccgac 60

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ccggagccgg gccccggcca ggtgctgttg aaggtgaccg cggccggagt ctgccactcc 120
gacatcgccg tgatgagctg gcccgcgag ggcttcccgt acgagctgcc gctcaccctc 180
ggccacgagg gcgtcgccac cgtggccgcg ctccggcgccg ggggtgacggg gctcgccgag 240
ggcgacgcgg tcgccgtgta cgggcccttg ggctgcggca cctgcgcca gtgcgcggag 300
ggcaaggaga actactgcct gcgcgccgac gagctgggca tccgtccgcc ggggctcggg 360
cgtccggggg ccatggccga gtacctgctg atcgacgacc cccggcacct ggtcccgcgtg 420
gacgggctcg acccggtcgc ggcgggtgccc ctcaccgacg ccggactgac gccgtaccac 480
gcgatcaagc ggtcgctgcc caagctggtc cccggctcca ccgcggtggt catcggcacc 540
ggtggtctcg gccacgtcgc catccagctg ctgcgcgccc tgacgtccgc ccgggtggtc 600
gccctggacg tcagcgagga gaagctgcgc ctcgcccgtg cgggtggcgc gcacgaggcg 660
gtgctgtcgg acgcgaaggc cgcggacgcg gtgcgcgaga tcaccggcgg tctcggtgcc 720
gaggccgtgt tcgacttcgt cggcgtggcg cccaccgtgc agaccgccgg agccgtcgcg 780
gccgtcgagg gcgatgtcac cctggtcggc atcggcggcg gatcgctgcc cgtcggcttc 840
ggcatgctgc cgttcgaggt gtcgggtcaac gcccctact ggggcagccg cagcgagctg 900
accgaggtgc tgaacctggc ccgctccggt gccgtgtcgg tgcacaccga gacgtactcc 960
ctggacgacg ccccgctcgc ctacgagcgg ctgcacgagg gcagggtcaa cggccgcgcg 1020
gtgatcctgc cccacggctg a 1041

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<210> 134

<211> 346

<212> PRT

<213> Artificial Sequence

<220>

<223> ADH from *S. coelicolor*

<400> 134

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Met Lys Ala Leu Gln Tyr Arg Thr Ile Gly Ala Pro Pro Glu Val Val
1      5      10      15
Thr Val Pro Asp Pro Glu Pro Gly Pro Gly Gln Val Leu Leu Lys Val
20     25     30
Thr Ala Ala Gly Val Cys His Ser Asp Ile Ala Val Met Ser Trp Pro
35     40     45
Ala Glu Gly Phe Pro Tyr Glu Leu Pro Leu Thr Leu Gly His Glu Gly
50     55     60
Val Gly Thr Val Ala Ala Leu Gly Ala Gly Val Thr Gly Leu Ala Glu
65     70     75     80
Gly Asp Ala Val Ala Val Tyr Gly Pro Trp Gly Cys Gly Thr Cys Ala
85     90     95
Lys Cys Ala Glu Gly Lys Glu Asn Tyr Cys Leu Arg Ala Asp Glu Leu
100    105    110
Gly Ile Arg Pro Pro Gly Leu Gly Arg Pro Gly Ser Met Ala Glu Tyr
115    120    125
Leu Leu Ile Asp Asp Pro Arg His Leu Val Pro Leu Asp Gly Leu Asp
130    135    140
Pro Val Ala Ala Val Pro Leu Thr Asp Ala Gly Leu Thr Pro Tyr His
145    150    155    160
Ala Ile Lys Arg Ser Leu Pro Lys Leu Val Pro Gly Ser Thr Ala Val
165    170    175
Val Ile Gly Thr Gly Gly Leu Gly His Val Ala Ile Gln Leu Leu Arg
180    185    190
Ala Leu Thr Ser Ala Arg Val Val Ala Leu Asp Val Ser Glu Glu Lys
195    200    205
Leu Arg Leu Ala Arg Ala Val Gly Ala His Glu Ala Val Leu Ser Asp
210    215    220
Ala Lys Ala Ala Asp Ala Val Arg Glu Ile Thr Gly Gly Leu Gly Ala
225    230    235    240
Glu Ala Val Phe Asp Phe Val Gly Val Ala Pro Thr Val Gln Thr Ala
245    250    255
Gly Ala Val Ala Val Glu Gly Asp Val Thr Leu Val Gly Ile Gly
260    265    270
Gly Gly Ser Leu Pro Val Gly Phe Gly Met Leu Pro Phe Glu Val Ser
275    280    285
Val Asn Ala Pro Tyr Trp Gly Ser Arg Ser Glu Leu Thr Glu Val Leu
290    295    300
Asn Leu Ala Arg Ser Gly Ala Val Ser Val His Thr Glu Thr Tyr Ser
305    310    315    320

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Leu Asp Asp Ala Pro Leu Ala Tyr Glu Arg Leu His Glu Gly Arg Val
325 330 335
Asn Gly Arg Ala Val Ile Leu Pro His Gly
340 345

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<210> 135
<211> 1056
<212> DNA
<213> Artificial Sequence
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<400> 135						
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gcgccaggcc	cgttcgatgc	aattgtgcgc	cctctggcag	tagcgccgtg	taccagcgat	120
attcatactg	tgtttgaagg	tgccattggc	gagcgtcaca	atatgattct	gggccatgaa	180
gccggttggtg	aagttgttga	ggttggcagc	gaagtgaagg	atttcaaacc	gggcgatcgc	240
gttgtcgttc	cagcgattac	cccgatttgg	cgcaccagcg	aagtccagcg	cggctaccat	300
cagcactctg	cgcgcatgct	ggccggctgg	aaattcagca	atgtaaaagg	tgggtgtgtc	360
ggtgaatttt	ttcacgttaa	cgacgcagac	atgaatctgg	cgcacctgcc	gaaagaaatc	420
ccgctggaag	cagcggttat	gattccggat	atgatgacca	cgggttttca	cggcgagag	480
ctggcggaca	ttgaactggg	cgctacggta	gccgtactgg	gcatacggct	ggtgggcctg	540
atggcagttg	caggcgctaa	gctgcgcggc	gcaggtcgta	ttattgccgt	tggttctcgc	600
ccggtgtgtg	tggacgcgcg	taagtattat	ggtgcaacgg	acattgtcaa	ttacaaggac	660
ggcccaattg	aatctcagat	catgaacctg	acggaaggta	aaggcgttga	cgccgcgatt	720
atcgttggcg	gcaacgccga	catcatggcg	accgcagtta	aaatcgtcaa	gccaggtggt	780
actattgcta	acgtcaacta	cttcggcgaa	ggtgaggtcc	tgcctgtccc	acgtctggaa	840
tgggggttgcg	gtattggcaca	taaaaccatt	aaaggttgcc	tgtgcccagg	cggccgtctg	900
cgtatggaac	gccctgacga	tctggtcttc	tacaaacgcg	tggatcctag	caaactgggtg	960
actcacgttt	tccgcggctt	tgataacatc	gaaaagcgtt	ttatgctgat	gaaagataaa	1020
ccgaaaatc	tgattaaacc	ggttgtcatc	ctggct			1056

<210> 136
<211> 352
<212> PRT
<213> Artificial sequence

Met	Lys	Gly	Phe	Ala	Met	Leu	Ser	Ile	Gly	Lys	Val	Gly	Trp	Ile	Glu
1				5					10					15	
Lys	Glu	Lys	Pro	Ala	Pro	Gly	Pro	Phe	Asp	Ala	Ile	Val	Arg	Pro	Leu
			20					25					30		
Ala	Val	Ala	Pro	Cys	Thr	Ser	Asp	Ile	His	Thr	Val	Phe	Glu	Gly	Ala
		35					40					45			
Ile	Gly	Glu	Arg	His	Asn	Met	Ile	Leu	Gly	His	Glu	Ala	Val	Gly	Glu
	50					55					60				
Val	Val	Glu	Val	Gly	Ser	Glu	Val	Lys	Asp	Phe	Lys	Pro	Gly	Asp	Arg
65					70					75					80
Val	Val	Val	Pro	Ala	Ile	Thr	Pro	Asp	Trp	Arg	Thr	Ser	Glu	Val	Gln
				85					90					95	
Arg	Gly	Tyr	His	Gln	His	Ser	Gly	Gly	Met	Leu	Ala	Gly	Trp	Lys	Phe
			100					105					110		
Ser	Asn	Val	Lys	Asp	Gly	Val	Phe	Gly	Glu	Phe	Phe	His	Val	Asn	Asp
		115					120					125			
Ala	Asp	Met	Asn	Leu	Ala	His	Leu	Pro	Lys	Glu	Ile	Pro	Leu	Glu	Ala
	130					135					140				
Ala	Val	Met	Ile	Pro	Asp	Met	Met	Thr	Thr	Gly	Phe	His	Gly	Ala	Glu
145					150					155					160
Leu	Ala	Asp	Ile	Glu	Leu	Gly	Ala	Thr	Val	Ala	Val	Leu	Gly	Ile	Gly
			165						170					175	
Pro	Val	Gly	Leu	Met	Ala	Val	Ala	Gly	Ala	Lys	Leu	Arg	Gly	Ala	Gly
			180					185					190		

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Arg Ile Ile Ala Val Gly Ser Arg Pro Val Cys Val Asp Ala Ala Lys
    195    200    205
Tyr Tyr Gly Ala Thr Asp Ile Val Asn Tyr Lys Asp Gly Pro Ile Glu
    210    215    220
Ser Gln Ile Met Asn Leu Thr Glu Gly Lys Gly Val Asp Ala Ala Ile
    225    230    235    240
Ile Ala Gly Gly Asn Ala Asp Ile Met Ala Thr Ala Val Lys Ile Val
    245    250    255
Lys Pro Gly Gly Thr Ile Ala Asn Val Asn Tyr Phe Gly Glu Gly Glu
    260    265    270
Val Leu Pro Val Pro Arg Leu Glu Trp Gly Cys Gly Met Ala His Lys
    275    280    285
Thr Ile Lys Gly Gly Leu Cys Pro Gly Gly Arg Leu Arg Met Glu Arg
    290    295    300
Leu Ile Asp Leu Val Phe Tyr Lys Arg Val Asp Pro Ser Lys Leu Val
    305    310    315    320
Thr His Val Phe Arg Gly Phe Asp Asn Ile Glu Lys Ala Phe Met Leu
    325    330    335
Met Lys Asp Lys Pro Lys Asp Leu Ile Lys Pro Val Val Ile Leu Ala
    340    345    350

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<210> 137

<211> 1125

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimized ADH from Horse Liver, E form

<400> 137

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atgagcacag cagggaaagt aattaaatgc aaagcagctg tgctgtggga ggaaaagaaa 60
ccattttcca ttgaggaggt ggaggtcgca cctccgaagg cccatgaagt ccgtattaag 120
atggtggcca cagggatctg tcgctcagat gaccacgtgg ttagtgggac cctggtcaca 180
cctctgcctg tgatcgcagg ccatgaggca gctggcattg tggagagcat cggggaaggc 240
gtcactacag tacgtccagg tgataaagtc atcccactgt ttactcctca gtgtgggaaa 300
tgccgtgttt gtaaacaccc tgaaggcaac ttctgtttga aaaatgatct gagcatgcct 360
cgtgggacca tgcaggatgg taccagccgt ttcacctgcc gtgggaagcc tatccaccac 420
ttcctgggca ccagcacctt ctcccagtac accgtgggtg acgagatctc agtggccaag 480
atcgatgcgg cctcacccgt ggagaaagtc tgtctgattg gctgtgggtt ttctactggt 540
tatgggtctg cagtcaaggt tgccaaggct acccagggct ccacctgtgc cgtgtttggc 600
ctgggggggg tgggcctgtc tgttatcatg ggctgtaaag cagccggggc ggcccgtatc 660
attgggggtg acatcaacaa agacaagtgt gcaaaggcca aagaagtggg tgccactgag 720
tgtgtcaacc ctcaggacta caagaaacct atccaggagg tgctgacaga aatgagcaat 780
gggggcgtgg atttttcatt tgaagtcatt ggtcgtctgg acaccatggt gactgccttg 840
tcatgtctgc aagaagcata tgggtgtgagc gtcacgttag gggtagctcc tgattcccaa 900
aatctgtcta tgaatcctat gttgtctgtg agtgggcgta cctggaaaagg ggctattttt 960
ggtgggttta agagtaaaaga ttctgtccct aaactgggtg ccgattttat ggctaaaaag 1020
tttgcactgg atcctttaat ccccatgtt ttaccttttg aaaaaattaa tgaagggttt 1080
gacctgctgc gctctgggga gagtatccgt accatcctga cgttt 1125

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<210> 138

<211> 375

<212> PRT

<213> Artificial Sequence

<220>

<223> ADH from Horse Liver, E form

<400> 138

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Met Ser Thr Ala Gly Lys Val Ile Lys Cys Lys Ala Ala Val Leu Trp
1      5      10      15
Glu Glu Lys Lys Pro Phe Ser Ile Glu Val Glu Val Ala Pro Pro
    20      25      30
Lys Ala His Glu Val Arg Ile Lys Met Val Ala Thr Gly Ile Cys Arg
    35      40      45
Ser Asp Asp His Val Val Ser Gly Thr Leu Val Thr Pro Leu Pro Val

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50 55 60
 Ile Ala Gly His Glu Ala Ala Gly Ile Val Glu Ser Ile Gly Glu Gly
 65 70 75 80
 Val Thr Thr Val Arg Pro Gly Asp Lys Val Ile Pro Leu Phe Thr Pro
 85 90 95
 Gln Cys Gly Lys Cys Arg Val Cys Lys His Pro Glu Gly Asn Phe Cys
 100 105 110
 Leu Lys Asn Asp Leu Ser Met Pro Arg Gly Thr Met Gln Asp Gly Thr
 115 120 125
 Ser Arg Phe Thr Cys Arg Gly Lys Pro Ile His His Phe Leu Gly Thr
 130 135 140
 Ser Thr Phe Ser Gln Tyr Thr Val Val Asp Glu Ile Ser Val Ala Lys
 145 150 155 160
 Ile Asp Ala Ala Ser Pro Leu Glu Lys Val Cys Leu Ile Gly Cys Gly
 165 170 175
 Phe Ser Thr Gly Tyr Gly Ser Ala Val Lys Val Ala Lys Val Thr Gln
 180 185 190
 Gly Ser Thr Cys Ala Val Phe Gly Leu Gly Gly Val Gly Leu Ser Val
 195 200 205
 Ile Met Gly Cys Lys Ala Ala Gly Ala Ala Arg Ile Ile Gly Val Asp
 210 215 220
 Ile Asn Lys Asp Lys Phe Ala Lys Ala Lys Glu Val Gly Ala Thr Glu
 225 230 235 240
 Cys Val Asn Pro Gln Asp Tyr Lys Lys Pro Ile Gln Glu Val Leu Thr
 245 250 255
 Glu Met Ser Asn Gly Gly Val Asp Phe Ser Phe Glu Val Ile Gly Arg
 260 265 270
 Leu Asp Thr Met Val Thr Ala Leu Ser Cys Cys Gln Glu Ala Tyr Gly
 275 280 285
 Val Ser Val Ile Val Gly Val Pro Pro Asp Ser Gln Asn Leu Ser Met
 290 295 300
 Asn Pro Met Leu Leu Leu Ser Gly Arg Thr Trp Lys Gly Ala Ile Phe
 305 310 315 320
 Gly Gly Phe Lys Ser Lys Asp Ser Val Pro Lys Leu Val Ala Asp Phe
 325 330 335
 Met Ala Lys Lys Phe Ala Leu Asp Pro Leu Ile Thr His Val Leu Pro
 340 345 350
 Phe Glu Lys Ile Asn Glu Gly Phe Asp Leu Leu Arg Ser Gly Glu Ser
 355 360 365
 Ile Arg Thr Ile Leu Thr Phe
 370 375

<210> 139

<211> 252

<212> PRT

<213> Artificial sequence

<220>

<223> Engineered Ketoreductase Sequence Formula with L. minor backbone

<223> Synthetic Construct

<220>

<221> MISC_FEATURE

<222>(7)..(7)

<223> Xaa is a constrained or non-polar residue

<220>

<221> MISC_FEATURE

<222>(17)..(17)

<223> Xaa is a non-polar or aliphatic residue

<220>

<221> MISC_FEATURE

<222>(25)..(25)

<223> Xaa is a polar or acidic residue

<220>
<221> MISC_FEATURE
<222>(27)..(27)
<223> Xaa is an aromatic residue

<220>
<221> MISC_FEATURE
<222>(41)..(41)
<223> Xaa is a polar, aliphatic, or non-polar residue

<220>
<221> MISC_FEATURE
<222>(53)..(53)
<223> Xaa is a polar, non-polar, or acidic residue

<220>
<221> MISC_FEATURE
<222>(57)..(57)
<223> Xaa is a non-polar or aliphatic residue

<220>
<221> MISC_FEATURE
<222>(64)..(64)
<223> Xaa is a polar, aliphatic, or non-polar residue

<220>
<221> MISC_FEATURE
<222>(66)..(66)
<223> Xaa is an acidic residue

<220>
<221> MISC_FEATURE
<222>(68)..(68)
<223> Xaa is a polar, acidic, aliphatic, or non-polar residue

<220>
<221> MISC_FEATURE
<222>(72)..(72)
<223> Xaa is a basic residue

<220>
<221> MISC_FEATURE
<222>(76)..(76)
<223> Xaa is an aliphatic, non-polar, or polar residue

<220>
<221> MISC_FEATURE
<222>(80)..(80)
<223> Xaa is an aliphatic, non-polar, or polar residue

<220>
<221> MISC_FEATURE
<222>(93)..(93)
<223> Xaa is is a polar, aliphatic, or non-polar residue

<220>
<221> MISC_FEATURE
<222>(94)..(94)
<223> Xaa is a cysteine, aliphatic, or non-polar residue

<220>
<221> MISC_FEATURE
<222>(95)..(95)
<223> Xaa is an aliphatic, non-polar, or acidic residue

<220>
<221> MISC_FEATURE
<222>(96)..(96)

<223> Xaa is is a cyteine, polar, aliphatic, or non-polar residue

<220>

<221> MISC_FEATURE

<222>(97)..(97)

<223> Xaa is a constrained or polar residue

<220>

<221> MISC_FEATURE

<222>(100)..(100)

<223> Xaa is a basic, acidic, polar, aliphatic, or non-polar residue

<220>

<221> MISC_FEATURE

<222>(108)..(108)

<223> Xaa is a basic or constrained residue

<220>

<221> MISC_FEATURE

<222>(111)..(111)

<223> Xaa is a non-polar or aliphatic residue

<220>

<221> MISC_FEATURE

<222>(139)..(139)

<223> Xaa is a non-polar or aliphatic residue

<220>

<221> MISC_FEATURE

<222>(145)..(145)

<223> Xaa is an acidic, aliphatic, or non-polar residue

<220>

<221> MISC_FEATURE

<222>(147)..(147)

<223> Xaa is an aromatic, aliphatic, or non-polar residue

<220>

<221> MISC_FEATURE

<222>(151)..(151)

<223> Xaa is a constrained, non-polar or aliphatic residue

<220>

<221> MISC_FEATURE

<222>(152)..(152)

<223> Xaa is a polar, aromatic, aliphatic, or non-polar residue

<220>

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<222>(163)..(163)

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 Arg Ser Ile Gly Xaa Thr Asp Val Ile Arg Phe Val Gln His Asp Xaa
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 Ser Asp Glu Xaa Gly Trp Thr Lys Leu Phe Asp Xaa Thr Glu Glu Xaa
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 Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Xaa Xaa Xaa Xaa
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 Val Asn Leu Asp Gly Val Phe Phe Gly Thr Arg Leu Gly Ile Gln Arg
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 Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
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 Lys Asp Xaa Asp Val Arg Val Asn Thr Val His Pro Gly Xaa Ile Lys
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 Arg Xaa Xaa Xaa Pro Met Gly Xaa Ile Gly Glu Pro Asn Asp Ile Ala
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 Trp Ile Cys Val Tyr Leu Ala Ser Xaa Glu Xaa Lys Phe Ala Thr Gly
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