SEQUENCE LISTING

<110> CODEXIS, Inc.
MUNDORFF, Emily
DEVRIES, Erik

<120> KETOREDUCTASE POLYPEPTIDES FOR THE STEREOSELECTIVE PRODUCTION OF (4S)-3-[(5S)-5-(4-FLUROPHENYL)-5-HYDROXYPENTANOYL]-4-PHENYL-1,3-OXAZOLIDIN-2-ONE

<130> CX2-025 (376247-021USP1)

<150> 61/092,807
<151> 2008-08-29

<160> 165

<170> PatentIn version 3.5

<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 ctggccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttgaggggtt cgtaggcgat ccgagcctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctat atcaagaccc cgctggtcga tgatctgccg 600

ggtgctgagg aagcgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catatatctg tgtgtacctg gcatctaatg aatcgaaatt tgcgacgggt 720

tccgaatttg tggtcgacgg cgggtatacc gcacagtaat ga 762

<210> 2
<211> 252
<212> PRT
<213> Artificial Sequence

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

<400> 2

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

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

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

<220>

<223> Codon Optimized L. Kefir Sequence

<400> 3

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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

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttgaggggtt cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctat atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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

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

<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

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

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

<220>
<223> Variant of L. kefir

<400> 5

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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

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa      300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc       360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat      420

atgagcagta ttgaggggtt cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag      480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat      540

gtgcgtgtca acacagtaca tccgggctgc atcaagaccc cgctggtcga tgatctggaa      600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgagccg      660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt      720
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gcagaatttg tggtcgacgg cgggtacacc 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 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

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

<220>
<223> Variant of L. kefir

<400> 7
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ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 8

Met Thr Asp Arg Leu Lys Ser 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 Ser
                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 Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys 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 Arg Thr Pro Met Gly His 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
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<210> 9
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 9

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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
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ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttgaggggct ggtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta 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 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

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

<220>
<223> Variant of L. kefir

<400> 11
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ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttctggggtt cgtaggcgat ccgacgacgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc gcacagtga 759

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

<220>

<223> Variant of L. kefir

<400> 12

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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

Phe Gly Pro Val Thr 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

Leu Gly Phe Val Gly Asp Pro Thr Thr 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 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 Val 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
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<210> 13
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 13
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gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttttcgggat ggtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgattgggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgatg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc 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 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 Arg 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 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

Phe Gly Met 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 Trp 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 Val 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> 15
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 15
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gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttttcgggat ggtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600

ggtgctgagg aaatgttttc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 16

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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 Arg 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 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

Phe Gly Met 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 Ala Glu Glu Met Phe 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 Val 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> 17
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 17
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggacact gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttttcgggat ggtaggcgat ccgactaccg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc 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 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

Phe Gly Pro Val Thr 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

Phe Gly Met Val Gly Asp Pro Thr Thr 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 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 Val 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> 19
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 19
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggacact gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttttcgggat ggtaggcgat ccgactaccg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgatgctcga tgattatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc 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 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

Phe Gly Pro Val Thr 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

Phe Gly Met Val Gly Asp Pro Thr Thr 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 Met Leu Asp Asp Tyr 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 Val 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> 21
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 21
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggacact gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttttcgggat ggtaggcgat ccgtctaccg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc 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 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

Phe Gly Pro Val Thr 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

Phe Gly Met Val Gly Asp Pro Ser Thr 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 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 Val 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> 23
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 23
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggacact gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttttcgggat ggtaggcgat ccgtctctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgatgctcga tgatctggaa 600

ggtgctgagg aaatgttttc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 24

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

Phe Gly Pro Val Thr 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

Phe Gly Met 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 Met Leu Asp Asp Leu Glu Gly Ala Glu Glu Met Phe 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 Val 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> 25
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 25
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggacact gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcgc 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg cgtccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gggttgttaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttttcgggat ggtaggcgat ccgactaccg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcccc atcaagaccc cgctgctcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catgggtctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtggacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 26

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 Arg 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 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

Phe Gly Met Val Gly Asp Pro Thr Thr 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 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 Val 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> 27
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 27
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttgcggggct ggtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgc atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<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 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

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

Ala 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 Cys 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
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<210> 29
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 29
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttgaggggct cgtaggcgat ccgacgggcg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggccct atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 30
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 30

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

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 Leu Val Gly Asp Pro Thr Gly 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 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> 31
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 31
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 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 tccgggccct atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 32
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 32

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

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 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 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> 33
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 33
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttagtgggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggccct atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 34
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 34

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

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

Ser 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 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> 35
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 35
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttcaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggcgca atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg 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

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

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

```
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 Ala 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> 37
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 37

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atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt       60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac      120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc      180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca      240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa      300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc       360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat      420

atgagcagta ttgaggggct cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag      480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat      540

gtgcgtgtca acacagtaca tccgggccct atcaagaccc cgctggtcga tgatctggaa      600

ggtgctgagg aaatgatgtc acagcgtacg ctgaccccta tgggccacat tggcgaaccg      660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt      720

gcagaatttg tggtcgacgg cgggtatacc 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 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

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 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 Val Asp Asp Leu Glu Gly Ala 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> 39
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 39
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttgaggggct cgtaggcgat ccgacgcagg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggccct atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 40
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 40

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

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 Leu Val Gly Asp Pro Thr Gln 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 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> 41
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 41
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg gtgtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg 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

Met Thr Asp Arg Leu Lys Ser 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 Gly Val Ser
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys 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 Arg Thr Pro Met Gly His 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> 43
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 43
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaac 420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 44

Met Thr Asp Arg Leu Lys Ser 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys 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 Arg Thr Pro Met Gly His 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> 45
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 45
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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 Ser 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 Ser
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 47
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 47
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatctggaa 600

ggtggggagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt 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 Ser 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 Ser
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Leu Glu Gly Gly Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 49
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 49
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgcta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc 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 Ser 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 Ser
85 90 95

Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp His Lys Leu Leu Ser
100 105 110

Ala Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 51
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 51
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgaagctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc 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 Ser 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 Ser
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Lys Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 53
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 53
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc 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 Ser 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 Ser
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 55
<211> 759

<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 55
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggatta gtgttcaaaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 56

Met Thr Asp Arg Leu Lys Ser 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 Ser Val Gln
85 90 95

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Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp His Lys Leu Leu Ser
            100                 105                 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
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<210> 57
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 57

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ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac      120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc      180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca      240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa      300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc       360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat      420

atgagcagta tcagtgggtt cgtaggcgat ccgacgctgg gggcatacac tgcttccaag      480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat      540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc agctggtcga tgatgatgaa      600
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ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 58

Met Thr Asp Arg Leu Lys Ser 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 Ser
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Gln Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 59
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 59
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggatta gtgttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgaagctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

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

<220>
<223> Variant of L. kefir

<400> 60

Met Thr Asp Arg Leu Lys Ser 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 Ser Val Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Lys Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 61
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 61
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggatta gtgttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc 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 Ser 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 Ser Val Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 63
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 63
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggct ggtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg 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 Ser 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 Ser
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 Ser 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

Ser Gly Leu Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 65
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 65
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ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttaataa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa *600*

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg 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 Ser 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 Asn
                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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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> 67
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 67

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atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt       60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac      120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc      180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca      240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa      300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc       360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat      420
```

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc ggctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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 Ser 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 Ser
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
            180                 185                 190

Thr Arg Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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> 69
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 69

```
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt       60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac      120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc      180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca      240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa      300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc       360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat      420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag      480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat      540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa      600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg      660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt      720

gcagaatttg tggtcgacgg 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 Ser 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 71
<211> 759
<212> DNA
<213> Artificial Sequence

<220>

<223> Variant of L. kefir

<400> 71

atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc ggctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt 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 Ser 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
            180                 185                 190

Thr Arg Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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> 73
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 73

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atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt       60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac      120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc      180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca      240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttactaa aagcgttgaa      300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc      360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat      420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag      480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat      540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc ggctggtcga tgatgatgaa      600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg      660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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 Ser 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 His Lys Leu Leu Ser
100 105 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
180 185 190

Thr Arg Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 75
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 75
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccactaaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcaacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc gcctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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 Ser Lys Val Ala Ile Val 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 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 Asn Thr Thr Glu Glu Ala
65                  70                  75                  80

Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Ala Val Gln
                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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
            180                 185                 190

Thr Arg Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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> 77
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 77
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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

Met Thr Asp Arg Leu Lys Ser 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 79
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 79
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccgt 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacac tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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

```
Met Thr Asp Arg Leu Lys Ser 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 Arg 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 Gln
                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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met Leu Gly Ala Tyr Thr 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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> 81
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 81
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccactaaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cattgcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcagtgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgaagatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val 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 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 Leu Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Val
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Glu Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 83
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 83
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccactaaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cattgcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcagtgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc ctctggtcga ggatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg 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

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val 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 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 Leu Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Val
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys Ile Lys
180 185 190

Thr Pro Leu Val Glu Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 85
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 85
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccactaaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg caatgcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcagtgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc gtctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val 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

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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 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 Met Gln
                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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Val
                165                 170                 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys Ile Lys
            180                 185                 190

Thr Arg Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
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<210> 87
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 87
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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

Met Thr Asp Arg Leu Lys Ser 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 Gln
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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 89
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 89
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagcgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg 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

Met Thr Asp Arg Leu Lys Ser 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 Gln
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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg 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> 91
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 91
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc 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 Ser 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

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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 Gln
                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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
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<210> 93
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 93

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atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt       60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac      120

gcggatgtag gtgaaaaggc cgccaaatca atcggcgata ctgatgttat tcgctttgtc      180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca      240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa      300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc      360
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ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcgatac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg 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 Ser 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 Asp 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 95
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 95
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cacttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 96
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 96

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Met Thr Asp Arg Leu Lys Ser 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 Leu Gln
                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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
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<210> 97
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 97
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gaacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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 Ser 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 Gln
85 90 95

Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Asn Lys Leu Leu Ser
100 105 110

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Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
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<210> 99
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 99

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atgactgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt       60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac      120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc      180

caacacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca      240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa      300

ggcactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc      360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat      420

atgagcagta tcagtgggtt agtaggcgat ccgatgctgg gggcatacaa tgcttccaag      480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat      540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa      600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg      660
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aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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 Ser 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 Gln
85 90 95

Lys Ser Val Glu Gly Thr Thr Thr Glu Glu Trp His Lys Leu Leu Ser
100 105 110

Val Asn Leu Asp Ser 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

Ser Gly Leu Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 101
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 101
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggatgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa gagcgttgaa 300

gacactacca cggaggaatg gcacaaactg atgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg 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 Ser 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 Gln
85 90 95

Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp His Lys Leu Met Ser
100 105 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 103
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 103
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgacac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactatgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatatc gcacagtga 759

<210> 104
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 104

Met Thr Asp Arg Leu Lys Ser 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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 Ile Ala Gln
245 250

<210> 105
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 105
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtaggtgag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgag 300

aacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatcca 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg 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

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Met Thr Asp Arg Leu Lys Ser 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 Gly 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 Gln
                85                  90                  95

Lys Ser Val Glu Asn Thr Thr Thr Glu Glu Trp His Lys Leu Leu Ser
            100                 105                 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Pro Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
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<210> 107
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 107
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccca gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc 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 Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

Gln 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 109
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 109
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctggatgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tggtgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 110
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 110

Met Thr Asp Arg Leu Lys Ser 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 Gln
85 90 95

Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp His Lys Leu Leu Asp
100 105 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Gly Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 111
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 111
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gtctaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 112
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 112

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

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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 Gln
                85                  90                  95

Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp Ser Lys Leu Leu Ser
            100                 105                 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
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<210> 113
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 113
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ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcgggtgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatgg cgttttttc 360

ggcacccgtc tgggcattcg ccgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcagtgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc gtctggtcga tgacgatcca 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 114
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 114

Met Thr Asn Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

Gln 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 Gly 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 Gln
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 Arg Arg
115 120 125

Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140

Ser Gly Phe Val Gly Asp Pro Met 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 Val
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys Ile Lys
180 185 190

Thr Arg Leu Val Asp Asp Asp Pro Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 115
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 115
atgaccaacc gtctgaagag caaagtagcc atcgtaaccg gcgggaccca gggtatcggt 60

ttcgcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatgg cgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggct ggtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcagtgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga tgatgatgaa 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 116
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 116

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Met Thr Asn Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1               5                  10                  15

Gln Gly Ile Gly Phe 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 Gln
                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

Ser Gly Leu Val Gly Asp Pro Met 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 Val
                165                 170                 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Asp Glu Gly Ala Glu Glu Met Met Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Val 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> 117
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 117
atgaccaacc gtctgaagag caaagtagcc atcgtaaccg gcgggaccca gggtatcggt 60

ttggcaatcg ccgataaatt tgtagccgag ggtgcgaaag tagttattac tggtcgccac 120

gcgggtgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cgggggaatg gcacaaactg ttgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcgt taaagatcca 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 118
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 118

Met Thr Asn Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

Gln Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Ala Glu Gly Ala
20 25 30

Lys Val Val Ile Thr Gly Arg His Ala Gly 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 Gln
85 90 95

Lys Ser Val Glu Asp Thr Thr Thr Gly Glu Trp His Lys Leu Leu Ser
100 105 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Val Lys Asp Pro Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 119
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 119
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccca gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcgggtgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgtttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcgattc gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga taaagatgag 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 120
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 120

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

Gln 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 Gly 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Lys Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 121
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 121
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccca gggtatcggt 60

ttggcaatcg ccgataaatt tgtagccgag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggtt cgtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcgattc gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga taaagatcca 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggtgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 122
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 122

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

Gln Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Ala 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 Gln
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 Ser 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

Ser Gly Phe Val Gly Asp Pro Met 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 Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Lys Asp Pro Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg 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> 123
<211> 759

<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 123
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccca gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgccac 120

gcgggtgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggct ggtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcgattc gtatcatgtc gaaaagcgca gcgctggatt gcgcagtgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga taaagatgag 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaaccg 660

aatgacgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 124
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 124

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

Gln 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 Gly 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 Gln
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 Ser 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

Ser Gly Leu Val Gly Asp Pro Met 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 Val
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Lys Asp Glu Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 125
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 125
atgaccgatc gtctgaagag caaagtagcc atcgtaaccg gcgggaccca gggtatcggt 60

ttggcaatcg ccgataaatt tgtagccgag ggtgcgaaag tagttattac tggtcgccac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggta ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagttcagaa aagcgttgaa 300

gacactacca cggaggaatg gcacaaactg ctgtccgtta atctggatag tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaag aataaaggct tgggcgctag catcatcaat 420

atgagcagta tcagtgggct ggtaggcgat ccgatgctgg gggcatacaa tgcttccaag 480

ggggcgattc gtatcatgtc gaaaagcgca gcgctggatt gcgcagtgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgt atcaagaccc cgctggtcga taaagatcca 600

ggtgctgagg aaatgatgtc acagcgtacg agaaccccta tgggccacat tggcgaacca 660

aacgatgtgg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 126
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 126

Met Thr Asp Arg Leu Lys Ser Lys Val Ala Ile Val Thr Gly Gly Thr
1 5 10 15

Gln Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Ala 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 Gln
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 Ser 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

Ser Gly Leu Val Gly Asp Pro Met 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 Val
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys Ile Lys
180 185 190

Thr Pro Leu Val Asp Lys Asp Pro Gly Ala Glu Glu Met Met Ser Gln
195 200 205

Arg Thr Arg Thr Pro Met Gly His 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> 127
<211> 762
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. Brevis

<400> 127
atgtctaacc gtctggatgg caaagtagcc atcattaccg gcgggactct gggtatcggt 60

ttggcaatcg ccacgaaatt tgtagaggag ggtgcgaaag taatgattac tggtcgtcac 120

tccgatgtag gtgaaaaggc cgccaaatca gtaggcactc cggatcagat tcagtttttt 180

cagcacgatt catccgatga agatggctgg acgaaactgt tcgacgccac cgagaaagca 240

ttcggcccgg ttagcacctt agtgaacaat gcagggattg cagttaacaa aagcgttgaa 300

gaaactacca cggccgaatg gcgtaaactg ctggccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttagcgggtt cgtaggcgat ccgagcctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgc atcaagaccc cgctggtcga tgatctgccg 600

ggtgctgagg aagcgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catatatctg tgtgtacctg gcatctaatg aatcgaaatt tgcgacgggt 720

tccgaatttg tggtcgacgg cgggtatacc gcacagtaat ga 762

<210> 128
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. brevis

<400> 128

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

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

Ser 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 Cys 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

<210> 129
<211> 759
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of L. Kefir

<400> 129
atgaccgatc gtctgaaggg caaagtagcc atcgtaaccg gcgggactct gggtatcggt 60

ttggcaatcg ccgataaatt tgtagaggag ggtgcgaaag tagttattac tggtcgtcac 120

gcggatgtag gtgaaaaggc cgccaaatca atcggcggca ctgatgttat tcgctttgtc 180

cagcacgatg catccgatga agcaggctgg acgaaactgt tcgacaccac cgaggaggca 240

ttcggcccgg ttacgaccgt cgtgaacaat gcagggattg cagtttccaa aagcgttgaa 300

gacactacca cggaggaatg gcgtaaactg ctgtccgtta atctggatgg tgttttttc 360

ggcacccgtc tgggcattca gcgcatgaaa aataaaggct tgggcgctag catcatcaat 420

atgagcagta ttagcgggtt cgtaggcgat ccgacgctgg gggcatacaa cgcttccaag 480

ggggcggtac gtatcatgtc gaaaagcgca gcgctggatt gcgcactgaa ggactacgat 540

gtgcgtgtca acacagtaca tccgggctgc atcaagaccc cgctggtcga tgatctggaa 600

ggtgctgagg aaatgatgtc acagcgtacg aaaaccccta tgggccacat tggcgaaccg 660

aatgacatcg catggatctg tgtgtacctg gcatctgacg aatcgaaatt tgcgacgggt 720

gcagaatttg tggtcgacgg cgggtatacc gcacagtga 759

<210> 130
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 130

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

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

Ser 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 Cys 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> 131
<211> 852
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Candida magnoliae

<400> 131
atggcaaaga attttagcaa tgtagagtat cccgcacccc cccccgcaca tacaaagaat 60

gagagcttac aagtattaga tttatttaag ttaaatggaa aagtagcaag cataacagga 120

agcagcagcg gaataggata tgcattagca gaggcttttg cacaagtcgg agcagatgta 180

gcaatatggt ataatagcca tgatgcaaca ggaaaagcag aggcattagc aaagaagtat 240

ggagtaaagg taaaggcata taaagcaaat gtaagcagca gcgatgcagt caagcaaaca 300

atagagcaac aaataaagga ttttggacat ttagatatag tagtagcaaa tgcaggaata 360

ccctggacaa agggagcata tatagatcaa gatgatgaca agcattttga ccaagtagta 420

gatgtagact taaagggagt aggatacgta gcaaagcatg caggaaggca ttttagggaa 480

aggtttgaga aagagggaaa aaagggagca ttagtattta cagcaagcat gagcggacat 540

atagtaaatg tcccccaatt ccaagcaaca tataatgcag caaaggcagg agtaaggcat 600

tttgcaaaga gcttagcagt cgagtttgca ccctttgcaa gggtaaatag cgtaagcccc 660

ggatatataa atacagagat aagcgatttc gtcccccaag agacacaaaa taagtggtgg 720

agcttagtcc ccttaggaag gggaggagag acagcagagt tagtaggagc atatttattc 780

ttagcaagcg atgcaggaag ctatgcaaca ggaacagata taatagtaga tggaggatat 840

acattaccct aa 852

<210> 132
<211> 283
<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Candida magnoliae

<400> 132

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Met Ala Lys Asn Phe Ser Asn Val Glu Tyr Pro Ala Pro Pro Pro Ala
1               5                  10                  15

His Thr Lys Asn Glu Ser Leu Gln Val Leu Asp Leu Phe Lys Leu Asn
            20                  25                  30

Gly Lys Val Ala Ser Ile Thr Gly Ser Ser Ser Gly Ile Gly Tyr Ala
        35                  40                  45

Leu Ala Glu Ala Phe Ala Gln Val Gly Ala Asp Val Ala Ile Trp Tyr
    50                  55                  60

Asn Ser His Asp Ala Thr Gly Lys Ala Glu Ala Leu Ala Lys Lys Tyr
65                  70                  75                  80

Gly Val Lys Val Lys Ala Tyr Lys Ala Asn Val Ser Ser Ser Asp Ala
                85                  90                  95

Val Lys Gln Thr Ile Glu Gln Gln Ile Lys Asp Phe Gly His Leu Asp
            100                 105                 110

Ile Val Val Ala Asn Ala Gly Ile Pro Trp Thr Lys Gly Ala Tyr Ile
        115                 120                 125

Asp Gln Asp Asp Asp Lys His Phe Asp Gln Val Val Asp Val Asp Leu
    130                 135                 140

Lys Gly Val Gly Tyr Val Ala Lys His Ala Gly Arg His Phe Arg Glu
145                 150                 155                 160

Arg Phe Glu Lys Glu Gly Lys Lys Gly Ala Leu Val Phe Thr Ala Ser
                165                 170                 175

Met Ser Gly His Ile Val Asn Val Pro Gln Phe Gln Ala Thr Tyr Asn
            180                 185                 190

Ala Ala Lys Ala Gly Val Arg His Phe Ala Lys Ser Leu Ala Val Glu
        195                 200                 205

Phe Ala Pro Phe Ala Arg Val Asn Ser Val Ser Pro Gly Tyr Ile Asn
    210                 215                 220
```

Thr Glu Ile Ser Asp Phe Val Pro Gln Glu Thr Gln Asn Lys Trp Trp
225 230 235 240

Ser Leu Val Pro Leu Gly Arg Gly Gly Glu Thr Ala Glu Leu Val Gly
245 250 255

Ala Tyr Leu Phe Leu Ala Ser Asp Ala Gly Ser Tyr Ala Thr Gly Thr
260 265 270

Asp Ile Ile Val Asp Gly Gly Tyr Thr Leu Pro
275 280

<210> 133
<211> 1047
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Rhodococcus erythropolis

<400> 133
atgaaagcca ttcagtacac 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

ggcctggaga actattgctc ccgtgcgcag gaactgggta ttaacccgcc tggtctgggt 360

gctccggggg ctttggcaga atttatgatt gtcgactcac cacgtcattt ggtcccgatt 420

ggcgatttag accctgttaa aactgttccg ttgactgatg cgggcctgac cccataccat 480

gcaatcaaac gctccctgcc gaaactgcgc ggcggctctt atgcagtagt gatcggtacg 540

ggtggcctgg gccacgtggc tatccaactg ctgcgtcatt tatctgctgc aacggtgatc 600

gccttggacg tttctgccga taaactggaa ctggctacca aagtcggcgc acatgaagta 660

gtcctgtctg ataaagatgc agcggagaat gtgcgtaaaa ttactggtag ccaaggtgca 720

gctttggtgt tggattttgt gggctatcag cctaccattg acaccgccat ggcagtggcg 780

ggcgtgggct ctgacgtcac cattgttggt atcggtgatg gccaggcaca tgcgaaagtt 840

ggtttcttcc agagtcctta tgaggcatcg gttacggtac cttattgggg cgctcgtaat 900

gaactgatcg aattgatcga tctggcgcat gctggtattt tcgacattgc cgttgagacc 960

ttctctttgg ataatggtgc agaggcctat cgtcgcctgg ctgcgggcac actgtcaggc 1020

cgtgcggtag tcgtcccggg cctgtaa 1047

<210> 134
<211> 348
<212> PRT
<213> Artificial Sequence

<220>

<223> ADH from Rhodococcus erythropolis

<400> 134

```
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> 135
<211> 1047
<212> DNA
<213> Artificial Sequence

<220>
<223> YGL ADH from Saccharomyces cervisiae

<400> 135

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atgaccacgg aaaaaaccgt agtgttcgtg tcaggcgcga ccggttttat tgctctgcac       60

gtggtagatg acctgctgaa aactggttac aaagtaattg gttccggtcg ttctcaggaa      120

aaaaatgacg gtttgctgaa gaagttcaag tccaacccga atctgagcat ggaaattgtg      180

gaagatattg cggcaccaaa cgccttcgat aaagtattcc agaaacatgg taaagaaatt      240

aaagtggtcc tgcatatcgc gtccccggtc catttcaaca ctaccgattt cgaaaaagac      300

ttactgatcc cggcggtaaa cggtaccaaa tctattttgg aagcaattaa gaactatgcc      360

gcagacaccg tggaaaaagt ggttattact tcatctgttg ccgcgttggc ctctccgggt      420

gatatgaaag ataccagctt cgtggttaac gaagaatcct ggaataaaga cacctgggaa      480

tcgtgtcagg cgaatgctgt gtccgcttat tgcggttcta aaaaattcgc agagaaaacg      540

gcgtgggact tcttggaaga aaaccagagc agcattaaat ttactctgtc cacgattaac      600

ccaggcttcg tttttggtcc gcagctgttc gccgactcct tgcgcaatgg tattaactct      660

agcagtgcga ttattgcgaa cctggtgtcg tataaattag gggataactt ctacaattat      720

agcggcccgt 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 tgcgtcccag     1020

ttgctggaag tgcaaagcaa aagctaa                                         1047
```

<210> 136
<211> 348
<212> PRT
<213> Artificial Sequence

<220>
<223> YGL ADH from Saccharomyces cervisiae

<400> 136

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

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> 137
<211> 939
<212> DNA
<213> Artificial Sequence

<220>
<223> YDL ADH from Saccharomyces cervisiae

<400> 137
atgtcttttc accaacagtt tttcacgctg aacaacggca ataaaatccc ggcgattgcc 60

atcatcggca 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 ggcttggaaa 420

gatatggagc agttatacaa aagtggtaaa gctaaaaaca tcggggtttc caatttcgca 480

gtggaagacc tgcaacgtat cctgaaagtc gctgaagtta aacctcaggt caaccagatt 540

gagttctctc cgttcctgca aaaccaaaca ccaggcattt ataaattctg tcaggagcac 600

gatatcctgg tggaagcata ttctccgctg ggcccgctgc agaagaaaac cgcgcaggat 660

gacagccaac catttttga gtacgtcaaa gaattgagcg aaaaatacat caaatccgag 720

gcccagatca tcctgcgctg ggtcactaaa cgcggtgtgc tgccagttac cacctcttca 780

aagcctcagc gcattagcga tgctcagaac ctgttttcct tcgacctgac agcggaagag 840

gttgataaaa tcacggagct gggtctggaa catgaaccgc tgcgcctgta ctggaataaa 900

ttgtatggca aatataacta cgccgcccag aaagtgtaa 939

<210> 138
<211> 312
<212> PRT
<213> Artificial Sequence

<220>
<223> YDL ADH from Saccharomyces cervisiae

<400> 138

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> 139
<211> 939
<212> DNA
<213> Artificial Sequence

<220>
<223> YPR ADH from Saccharomyces cervisiae

<400> 139
atgccggcaa cgttaaaaaa cagcagtgct accttaaaat taaacacagg tgcgagcatt 60

cctgtcctgg ggttcggcac ctggcgctct gtcgataaca acggctatca tagtgtaatt 120

gcggcgctga aagcggggta ccgtcatatc gatgctgcgg ccatctatct gaatgaagaa 180

gaagtcggcc gtgcgatcaa ggactccggt gttcctcgtg aagaaatttt tattaccacc 240

aaactgtggg gcaccgaaca acgcgatcca gaagcagccc tgaacaaatc tctgaaacgt 300

ctgggtctgg actatgtgga cctgtatctg atgcactggc cggtccctct gaaaacagac 360

cgtgtaactg acggtaacgt cctgtgcatc ccgaccctgg aagatggcac cgtggacatc 420

gataccaaag agtggaattt tattaaaacc tgggaactga tgcaggaatt gccgaaaact 480

ggtaagacca aagccgtcgg tgtgtccaat ttttccatca acaatatcaa agaactgctg 540

gaatcgccaa ataacaaggt cgttccagca accaatcaga tcgagattca tccgttgctg 600

ccgcaggatg aattaatcgc cttttgtaaa gaaaaaggca ttgtggtcga agcatatagc 660

ccattcggct ccgctaacgc cccgctgctg aaagaacagg cgattatcga tatggccaaa 720

aagcacggcg tcgaaccggc gcaactgatt atcagctggt cgattcagcg cggttatgtg 780

gtattggcca agtccgtaaa tccggagcgt atcgtgtcga actttaagat ttttaccctg 840

ccagaggatg atttcaaaac catctctaac ctgagcaaag tgcacggtac caaacgtgtc 900

gttgacatga aatggggctc atttccgatt tttcaataa 939

<210> 140
<211> 312
<212> PRT
<213> Artificial Sequence

<220>
<223> YPR ADH from Saccharomyces cervisiae

<400> 140

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 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

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> 141
<211> 1029
<212> DNA
<213> Artificial Sequence

<220>
<223> GRE ADH from Saccharomyces cervisiae

<400> 141
atgtctgtgt tcgtgtcagg cgcgaatggt tttattgctc agcacatcgt agatctgctg 60

ctgaaagaag attacaaagt aattggttcc gcacgttctc aggaaaaagc tgaaaatttg 120

accgaagcct tcggtaacaa cccgaaattt agcatggaag tggtgcctga tattagcaaa 180

ctggatgcct tcgatcatgt attccagaaa catggtaaag atattaaaat cgtcctgcat 240

accgcgtccc cgttttgttt cgatattacc gattccgaac gtgacttact gatcccggcg 300

gtaaacggtg tcaaaggtat tttgcacagt attaagaaat atgccgcaga cagcgtggaa 360

cgcgtggttc tgacttcatc ttacgccgcg gtatttgata tggcgaagga aaacgataag 420

agcctgacct tcaacgaaga atcctggaat ccggcgacct gggaatcgtg tcagagtgat 480

ccggtgaacg cttattgcgg ttctaaaaaa ttcgcagaga aagcagcgtg ggaattcttg 540

gaagaaaacc gtgatagcgt gaaatttgag ctgacagcgg tcaacccagt ttacgttttt 600

ggtccgcaga tgttcgataa agatgttaaa aaacacttga acaccagctg cgaactggtg 660

aactctctga tgcatctgag ccctgaagat aaaattccgg aactgtttgg cggttacatc 720

gacgtccgtg acgttgcgaa agctcatctg gttgcatttc agaaacgtga aacaatcggt 780

cagcgcctga tcgtgtcgga ggcacgtttc acgatgcagg acgttctgga cattctgaac 840

gaagactttc cagtactgaa gggcaatatc ccggtcggca agcctggcag cggcgccacc 900

cataatactc tgggcgccac cctggacaat aaaaaaagca aaaaattgct gggcttcaaa 960

ttccgtaatc tgaaagagac tattgacgat actgcgtccc agatcctgaa attcgaaggt 1020

cgcatttaa 1029

<210> 142
<211> 342
<212> PRT
<213> Artificial Sequence

<220>
<223> GRE ADH from Saccharomyces cervisiae

<400> 142

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

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> 143
<211> 1041
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Streptomycel coelicolor

<400> 143

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atgaaggcac tgcagtaccg caccatcggc gccccgcccg aggtcgtcac cgtcccggac       60

ccggagccgg gccccggcca ggtgctgttg aaggtgaccg cggccggagt ctgccactcc      120

gacatcgcgg tgatgagctg gcccgccgag ggcttcccgt acgagctgcc gctcaccctc      180

ggccacgagg gcgtcggcac cgtggccgcg ctcggcgccg gggtgacggg gctcgccgag      240

ggcgacgcgg tcgccgtgta cgggccctgg ggctgcggca cctgcgccaa gtgcgcggag      300

ggcaaggaga actactgcct gcgcgccgac gagctgggca tccgtccgcc ggggctcggg      360

cgtccggggt ccatggccga gtacctgctg atcgacgacc cccggcacct ggtcccgctg      420

gacgggctcg acccggtcgc ggcggtgccg ctcaccgacg ccggactgac gccgtaccac      480

gcgatcaagc ggtcgctgcc caagctggtc cccggctcca ccgcggtggt catcggcacc      540

ggtggtctcg gccacgtcgc catccagctg ctgcgcgccc tgacgtccgc ccgggtggtc      600

gccctggacg tcagcgagga gaagctgcgc ctcgcccgtg cggtgggcgc 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 gtcggtcaac gccccctact ggggcagccg cagcgagctg 900

accgaggtgc tgaacctggc ccgctccggt gccgtgtcgg tgcacaccga gacgtactcc 960

ctggacgacg ccccgctcgc ctacgagcgg ctgcacgagg gcagggtcaa cggccgcgcg 1020

gtgatcctgc cccacggctg a 1041

<210> 144
<211> 346
<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Streptomycel coelicolor

<400> 144

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 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

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

<210> 145
<211> 1032
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Sporobolomyces salmonicolor

<400> 145
atggcaaaga tcgacaacgc agttctgccg gagggttctc tggtgctggt caccggcgcg 60

aacggctttg tcgctagcca tgtggtcgaa caactgctgg aacacggcta taaggtgcgc 120

ggcactgctc gctctgcctc caaactggcg aacctgcaga aacgttggga cgccaaatac 180

cctggtcgtt tcgagactgc cgttgttgaa gacatgctga agcagggtgc atatgatgaa 240

gttattaaag gcgcggcagg tgtcgcccac atcgcgtccg tggtcagctt ttctaacaaa 300

tatgatgagg tggtaactcc tgcgatcggt 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 ttcatggacg aaaacaaacc gcactttact 600

ctgaatgccg ttctgccaaa ctacactatc ggtaccattt ttgacccaga aacccaatcc 660

ggttccactt ccggctggat gatgtctctg ttcaatggcg aagtatctcc ggcactggcg 720

ctgatgccgc cgcagtacta tgtctctgca gttgatatcg gtctgctgca cctgggttgt 780

ctggttctgc cgcaaatcga acgccgtcgt gtttacggca ccgcaggcac ctttgattgg 840

aacaccgttc tggcgacctt ccgtaaactg tatccgtcca agacgttccc ggctgacttt 900

ccggatcagg gccaggatct gtccaaattt gataccgccc cgagcctgga gattctgaaa 960

tccctgggcc gccctggctg gcgtagcatc gaggaatcta tcaaagatct ggtgggttcc 1020

gagaccgcct aa 1032

<210> 146
<211> 343
<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Sporobolomyces salmonicolor

<400> 146

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 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> 147
<211> 1050
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Aspergillus flavus

<400> 147
atgtctattc cggaaatgca atgggctcaa gtagcggagc agaaaggcgg tccgctgatt 60

tacaaacaga ttccggttcc gaaaccgggc ccggacgaaa tcctggtaaa agtgcgttac 120

tctggtgtgt gccacacgga tctgcacgcg ctgaaaggtg actggccact gcctgtgaaa 180

atgccactgg tgggtggcca tgagggcgcg ggtgttgtcg tcgctcgtgg cgatctggtt 240

actgagttcg aaattggtga ccatgctggc ctgaaatggc tgaacggtag ctgcctggca 300

tgcgagttct gtaaacaggc tgacgaaccg ctgtgcccta acgcgagcct gtctggttat 360

actgtagatg gtactttcca gcagtatgcc attggcaaag ccacccatgc gagcaagctg 420

ccgaaaaacg tgcctctgga tgccgtggca ccggttctgt gcgcgggcat taccgtatac 480

aagggcctga aagaaagcgg tgttcgtcct ggccaaaccg ttgcgatcgt aggtgcgggt 540

ggtggtctgg gctccctggc gctgcagtac gcgaaagcta tgggtattcg cgtggtggcg 600

attgatggcg gtgaagagaa acaagcgatg tgtgaacagc tgggcgcaga agcctacgtt 660

gactttacca aaacgcaaga tctggtagca gatgttaagg ccgccacccc tgaaggtctg 720

ggcgcgcatg cggtaattct gctggcggtc gccgaaaaac catttcagca ggcggccgaa 780

tatgtcagcc gtggtacggt ggttgccatt ggtctgccgg cgggcgcatt cctgcgcgcg 840

ccggtgttta acactgtggt tcgtatgatt aacattaagg gtagctacgt tggcaaccgc 900

caggacggcg ttgaggcagt ggacttcttc gcgcgcggcc tgatcaaagc gccgttcaaa 960

accgctcctc tgcaagatct gccgaaaatc ttcgaactga tggaacaagg taagattgca 1020

ggtcgctacg ttctggaaat cccggaatga 1050

<210> 148
<211> 349
<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Aspergillus flavus

<400> 148

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

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 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> 149
<211> 729
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Oenococcus oeni

<400> 149
atgtttgatc gcctgaaggg taaggtggcg atcgtcaccg gcggtaatag cggtattggt 60

aaggcaatcg cggcagactt catcgccgag ggcgcgaaag tagtgattac cggtcgcaac 120

caagagaagg gtcgccagac tgcgctggaa atcgccggtg acattctgtt cattcagcag 180

gacgtgagcc aggaggcgga ctggcagaaa gttatctcca aaaccatcga gaagttcggt 240

aagtttgata ttctggttaa caacgctggc gtcggcggcg tgggtaagcc actggcagaa 300

atgtccctgt ctgaattcaa ttggacccaa tccattaatc tgtccggtaa cttcctgggt 360

attcacttcg cgctgaacaa aatgaccgaa cctggtagca ttattgacgt aagcagcgcg 420

gctggcctgc gtggttttcc gggcgcagcc gattatagcg cttccaaagg tggtacgcgt 480

ctgctgacgc gcgccgcggc gctggaagcg ctgcaaatgg gtaaaaagat ccgtgtaaac 540

tctattcacc caggttggat tgataccgat atcgtaccaa aagatatgcg tgagcaggtt 600

atcgcgatga cccctatgca tcacctgggc caaccgaaag atattgccaa gctggcgacg 660

tatctggcat ctgacgagtc cgagtatact acgggctccg aactggcagc cgacggcggt 720

ctgatggca 729

<210> 150
<211> 243
<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Oenococcus oeni

<400> 150

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 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> 151
<211> 768
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Ralstonia eutropha

<400> 151
atgcagggca aaattgcact ggttacgggc ggtgcgtctg gtatgggtct ggccttcacc 60

cgtcgcctgg cccaagaagg cgcacgtgtt tacttcaccg acattaacgg cgccgcgggt 120

cacgcgacgg aaagcgagct gcagggtgct ggtctggcgg tcgtattcct gcgtcatgac 180

gtgacccagg aaaacgactg gctgcgcgtc ctggaacata ttggcgctgt tgacggtcgc 240

ctggatgtac tggtgaataa tgccggcatt gcgatttctc acaacattga gacttgtact 300

actgaggatt ttgatcgcac gctgaatgtt aacctgaagt ccgtgtttct gggctgcaaa 360

cacggtctgg ctctgatgaa acagaagggt ggcagcatca ttaacgttag ctctatcacc 420

gcgatttgcg gcgaacctgt ggcgctggcg tatagcgcta gcaaagccgg cgtccgtttt 480

ctgagcaagt ctgttgccct gcattgtgcg gagaagggct acgccatccg tgttaacagc 540

ctgcacccgg gttacattga taccccgctg ctggcaggca gcaacgcggg tggctccctg 600

accgctgacg aggtaaccgc gagccgtgta cgtattggcg gtgaaattcc gctgaaacgt 660

cgcggcaccc cggacgaagt tgcaggcgcg gttctgtacc tggctagcga tgaatccacc 720

tatgttactg gtactgagct ggtaattgat ggcggctacg catgtcat 768

<210> 152
<211> 256

<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Ralstonia eutropha

<400> 152

```
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> 153
<211> 1056
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Thermoanaerobium brockii

<400> 153
atgaaaggct tcgccatgct gagcatcggc aaagtgggtt ggattgaaaa agaaaaaccg 60

gcgccaggcc cgttcgatgc aattgtgcgc cctctggcag tagcgccgtg taccagcgat 120

attcatactg tgtttgaagg tgccattggc gagcgtcaca atatgattct gggccatgaa 180

gccgttggtg aagttgttga ggttggcagc gaagtgaagg atttcaaacc gggcgatcgc 240

gttgtcgttc cagcgattac cccggattgg cgcaccagcg aagtccagcg cggctaccat 300

cagcactctg gcggcatgct ggccggctgg aaattcagca atgtaaagga tggtgtgttc 360

ggtgaatttt ttcacgttaa cgacgcagac atgaatctgg cgcacctgcc gaaagaaatc 420

ccgctggaag cagcggttat gattccggat atgatgacca cgggttttca cggcgcagag 480

ctggcggaca ttgaactggg cgctacggta gccgtactgg gcatcggtcc ggtgggcctg 540

atggcagttg caggcgctaa gctgcgcggc gcaggtcgta ttattgccgt tggttctcgc 600

ccggtgtgtg tggacgccgc taagtattat ggtgcaacgg acattgtcaa ttacaaggac 660

ggcccaattg aatctcagat catgaacctg acggaaggta aaggcgttga cgccgcgatt 720

atcgctggcg gcaacgccga catcatggcg accgcagtta aaatcgtcaa gccaggtggt 780

actattgcta acgtcaacta cttcggcgaa ggtgaggtcc tgcctgtccc acgtctggaa 840

tggggttgcg gtatggcaca taaaaccatt aaaggtggcc tgtgcccagg cggccgtctg 900

cgtatggaac gcctgatcga tctggtcttc tacaaacgcg tggatcctag caaactggtg 960

actcacgttt tccgcggctt tgataacatc gaaaaagctt ttatgctgat gaaagataaa 1020

ccgaaagatc tgattaaacc ggttgtcatc ctggct 1056

<210> 154
<211> 352
<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Thermoanaerobium brockii

<400> 154

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

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

<210> 155
<211> 1125
<212> DNA
<213> Artificial Sequence

<220>
<223> ADH from Hore Liver E form

<400> 155
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 ttctgcttga aaaatgatct gagcatgcct 360

cgtgggacca tgcaggatgg taccagccgt ttcacctgcc gtgggaagcc tatccaccac 420

ttcctgggca ccagcacctt ctcccagtac accgtggtgg acgagatctc agtggccaag 480

atcgatgcgg cctcaccgct ggagaaagtc tgtctgattg gctgtgggtt ttctactggt 540

tatgggtctg cagtcaaggt tgccaaggtc acccagggct ccacctgtgc cgtgtttggc 600

ctgggggggg tgggcctgtc tgttatcatg ggctgtaaag cagccggggc ggcccgtatc 660

attggggtgg acatcaacaa agacaagttt gcaaaggcca aagaagtggg tgccactgag 720

tgtgtcaacc ctcaggacta caagaaacct atccaggagg tgctgacaga aatgagcaat 780

gggggcgtgg atttttcatt tgaagtcatt ggtcgtctgg acaccatggt gactgccttg 840

tcatgctgtc aagaagcata tggtgtgagc gtcatcgtag gggtacctcc tgattcccaa 900

aatctgtcta tgaatcctat gttgctgctg agtgggcgta cctggaaagg ggctattttt 960

ggtggtttta agagtaaaga ttctgtccct aaactggtgg ccgattttat ggctaaaaag 1020

tttgcactgg atcctttaat cacccatgtt ttacctttg aaaaaattaa tgaagggttt 1080

gacctgctgc gctctgggga gagtatccgt accatcctga cgttt 1125

<210> 156
<211> 375
<212> PRT
<213> Artificial Sequence

<220>
<223> ADH from Hore Liver

<400> 156

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 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
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

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<213> Lactobacillus Minor

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ttggcaatcg ctgataagtt tgttgaagaa ggcgcaaagg ttgttattac cggccgtcac 120

gctgatgtag gtgaaaaagc tgccagatca atcggcggca cagacgttat ccgttttgtc 180

caacacgatg cttctgatga aaccggctgg actaagttgt ttgatacgac tgaagaagca 240

tttggcccag ttaccacggt tgtcaacaat gccggaattg cggtcagcaa gagtgttgaa 300

gataccacaa ctgaagaatg gcgcaagctg ctctcagtta acttggatgg tgtcttcttc 360

ggtacccgtc ttggaatcca acgtatgaag aataaaggac tcggagcatc aatcatcaat 420

atgtcatcta tcgaaggttt tgttggtgat ccagctctgg gtgcatacaa cgcttcaaaa 480

ggtgctgtca gaattatgtc taaatcagct gccttggatt gcgctttgaa ggactacgat 540

gttcgggtta acactgttca tccaggttat atcaagacac cattggttga cgatcttgaa 600

ggggcagaag aaatgatgtc acagcggacc aagacaccaa tgggtcatat cggtgaacct 660

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gcagaattcg ttgtcgacgg agggtacacc gcccaatag 759

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<211> 252
<212> PRT
<213> Lactobacillus Minor

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Leu Gly Ile Gly Leu Ala Ile Ala Asp Lys Phe Val Glu Glu Gly Ala
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Lys Val Val Ile Thr Gly Arg His Ala Asp Val Gly Glu Lys Ala Ala
35 40 45

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
65 70 75 80

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 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
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> 159
<211> 759

<212> DNA
<213> variant of L. Minor

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gctgatgtag gtgaaaaagc tgccagatca atcggcggca cagacgttat ccgttttgtc 180

caacacgatg cttctgatga aaccggctgg actaagttgt ttgatacgac tgaagaagca 240

tttggcccag ttaccacggt tgtcaacaat gccggaattg cggtcagcaa gagtgttgaa 300

gataccacaa ctgaagaatg gcgcaagctg ctctcagtta acttggatgg tgtcttcttc 360

ggtacccgtc ttggaatcca acgtatgaag aataaaggac tcggagcatc aatcatcaat 420

atgtcatcta tcagtggttt tgttggtgat ccagctctgg gtgcatacaa cgcttcaaaa 480

ggtgctgtca gaattatgtc taaatcagct gccttggatt gcgctttgaa ggactacgat 540

gttcgggtta acactgttca tccaggttgt atcaagacac cattggttga cgatcttgaa 600

ggggcagaag aaatgatgtc acagcggacc aagacaccaa tgggtcatat cggtgaacct 660

aacgatatcg cttggatctg tgtttacctg gcatctgacg aatctaaatt tgccactggt 720

gcagaattcg ttgtcgacgg agggtacacc gcccaatag 759

<210> 160
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<212> PRT
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<400> 160

Met Thr Asp Arg Leu Lys Gly Lys Val Ala Ile Val Thr Gly Gly Thr
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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

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
65 70 75 80

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

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Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
    130                 135                 140

Ser 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
                165                 170                 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Cys 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
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<210> 161
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Synthetic Construct

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Xaa Gly Ile Gly Xaa Ala Ile Ala Xaa Lys Phe Val Xaa Glu Gly Ala
20 25 30

Lys Val Met Ile Thr Gly Arg Xaa Ser Xaa Val Gly Glu Lys Ala Ala
35 40 45

Lys Ser Val Gly Xaa Pro Asp Gln Ile Gln Phe Phe Gln His Asp Ser
50 55 60

Ser Asp Glu Asp Gly Trp Thr Lys Leu Phe Xaa Ala Thr Glu Lys Ala
65 70 75 80

Phe Gly Pro Val Ser Thr Leu Val Asn Asn Ala Gly Ile Xaa Xaa Xaa
85 90 95

Lys Ser Val Glu Xaa Thr Thr Thr Xaa Glu Trp Xaa Lys Leu Xaa Xaa
100 105 110

Xaa Asn Leu Asp Xaa Val Phe Phe Gly Thr Arg Leu Gly Ile Xaa Arg
115 120 125

Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140

Xaa Gly Xaa Val Gly Asp Pro Xaa Leu Gly Ala Tyr Xaa Ala Ser Lys
145 150 155 160

Gly Ala Xaa Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Xaa
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Xaa Ile Lys
180 185 190

Thr Xaa Leu Val Xaa Xaa Xaa Xaa Gly Xaa Glu Glu Ala Xaa Ser Gln
195 200 205

Arg Thr Xaa Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Xaa 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 Xaa Ala Gln
245 250

<210> 162
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Synthetic Construct

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Lys Val Val Ile Thr Gly Arg Xaa Ala Xaa Val Gly Glu Lys Ala Ala
35 40 45

Lys Ser Ile Gly Xaa Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
50 55 60

Ser Asp Glu Ala Gly Trp Thr Lys Leu Phe Xaa Thr Thr Glu Glu Ala
65 70 75 80

Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Xaa Xaa Xaa
85 90 95

Lys Ser Val Glu Xaa Thr Thr Thr Xaa Glu Trp Xaa Lys Leu Xaa Xaa
100 105 110

Xaa Asn Leu Asp Xaa Val Phe Phe Gly Thr Arg Leu Gly Ile Xaa Arg
115 120 125

Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140

Xaa Gly Xaa Val Gly Asp Pro Xaa Leu Gly Ala Tyr Xaa Ala Ser Lys
145 150 155 160

Gly Ala Xaa Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Xaa
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Xaa Ile Lys
180 185 190

Thr Xaa Leu Val Xaa Xaa Xaa Xaa Gly Xaa Glu Glu Met Xaa Ser Gln
195 200 205

Arg Thr Xaa Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Xaa 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 Xaa Ala Gln
245 250

<210> 163
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<212> PRT
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Synthetic Construct

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<222> (211)..(211)
<223> Xaa is a basic residue

<220>
<221> MISC_FEATURE
<222> (223)..(223)
<223> Xaa is a nonpolar or aliphatic residue

<220>
<221> MISC_FEATURE
<222> (250)..(250)
<223> Xaa is a polar or nonpolar residue

<400> 163

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Met Thr Xaa Arg Leu Lys Xaa Lys Val Ala Ile Val Thr Gly Gly Thr
1               5                  10                  15

Xaa Gly Ile Gly Xaa Ala Ile Ala Xaa Lys Phe Val Xaa Glu Gly Ala
            20                  25                  30

Lys Val Val Ile Thr Gly Arg Xaa Ala Xaa Val Gly Glu Lys Ala Ala
        35                  40                  45

Arg Ser Ile Gly Xaa Thr Asp Val Ile Arg Phe Val Gln His Asp Ala
    50                  55                  60

Ser Asp Glu Thr Gly Trp Thr Lys Leu Phe Xaa Thr Thr Glu Glu Ala
65                  70                  75                  80

Phe Gly Pro Val Thr Thr Val Val Asn Asn Ala Gly Ile Xaa Xaa Xaa
                85                  90                  95

Lys Ser Val Glu Xaa Thr Thr Thr Xaa Glu Trp Xaa Lys Leu Xaa Xaa
            100                 105                 110

Xaa Asn Leu Asp Xaa Val Phe Phe Gly Thr Arg Leu Gly Ile Xaa Arg
        115                 120                 125
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Met Lys Asn Lys Gly Leu Gly Ala Ser Ile Ile Asn Met Ser Ser Ile
130 135 140

Xaa Gly Xaa Val Gly Asp Pro Xaa Leu Gly Ala Tyr Xaa Ala Ser Lys
145 150 155 160

Gly Ala Xaa Arg Ile Met Ser Lys Ser Ala Ala Leu Asp Cys Ala Xaa
165 170 175

Lys Asp Tyr Asp Val Arg Val Asn Thr Val His Pro Gly Xaa Ile Lys
180 185 190

Thr Xaa Leu Val Xaa Xaa Xaa Xaa Gly Xaa Glu Glu Met Xaa Ser Gln
195 200 205

Arg Thr Xaa Thr Pro Met Gly His Ile Gly Glu Pro Asn Asp Xaa 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 Xaa Ala Gln
245 250

<210> 164
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 164

Met Thr Asp Arg Leu Lys Ser 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 Asn Val Ser
85 90 95

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Lys Ser Val Glu Asp Thr Thr Thr Glu Glu Trp His Lys Leu Leu Ser
            100                 105                 110

Val Asn Leu Asp Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys 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 Arg Thr Pro Met Gly His 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
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<210> 165
<211> 252
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of L. kefir

<400> 165

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Met Thr Asp Arg Leu Lys Ser 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 Ser
                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 Ser 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

Ser Gly Phe Val Gly Asp Pro Thr Leu Gly Ala Tyr Thr 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 Cys Ile Lys
            180                 185                 190

Thr Pro Leu Val Asp Asp Leu Glu Gly Ala Glu Glu Met Gly Ser Gln
        195                 200                 205

Arg Thr Arg Thr Pro Met Gly His 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
```