<110> CJ CheilJedang Corporation

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<151> 2012-04-24

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<400> 7
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<400> 11
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<400> 13
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<400> 22
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<210> 24
<211> 35
<212> DNA
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<220>
<223> primer

<400> 24
tagaactagt caaccgttgt cgaaagcatt gcggt 35

<210> 25
<211> 981
<212> DNA
<213> Lactobacillus paracasei ldh

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ggttcaagtt atgcctacgc aatggttttg caaggtatcg ctcaggaaat cggaatcgtt 120

gacattttca aggacaagac aaagggtgac gcgattgact tgagcaacgc gctcccattc 180

acaagtccta agaagattta ttcagctgaa tacagcgatg ctaaggatgc tgatctggtt 240

gttatcacag ctggcgctcc tcagaagcct ggcgaaactc gtttggactt ggttaacaag 300

aacttgaaga tcttgaagtc cattgttgac ccaatcgttg attccggctt taacggtatt 360

ttcttagttg ctgccaaccc agttgacatt ttgacctatg caacttggaa actttctggc 420

ttcccgaaga accgggttgt tggttccggt acttcactgg acaccgcccg cttccgtcag 480

tccattgctg aaatggttaa tgttgacgct cgttcggtcc acgcttacat catgggcgaa 540

catggtgaca ctgaattccc tgtatggtcc cacgctaaca ttggtggcgt taccatcgct 600

gaatgggtta aggctcatcc agaaatcaag gaagacaagc ttgttaagat gtttgaagac 660

gttcgtgacg ccgcttatga aatcatcaaa ctcaagggtg cgaccttcta tggtatcgca 720

actgcccttg cccggatttc aaaggcaatc cttaacgacg aaaatgcggt tctgccactt 780

tccgtttaca tggatggtca atatggcttg aacgacatct acatcggtac cccagctgtg 840

atcaaccgta atggtatcca gaacatcctg gaaatcccat tgaccgatca cgaagaagaa 900

tccatgcaga aatctgcttc tcaattgaag aaggttctga ccgatgcttt cgctaagaat 960

gacatcgaaa ctcgtcagta a 981

<210> 26
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<212> DNA
<213> Lactobacillus paracasei ldh1

<400> 26
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aaagaaaacc cagatgttga agttaaatta gttccagaat tacttactga agacaacgtt 120

gacttagcta aaggcttcga cggtgccgat gtataccaac aaaaggacta tactgctgaa 180

gtattgaaca agttagccga cgaaggggtt aagaacatct ctcttcgtaa cgttggtgtt 240

gataacttgg acgttcctac tgttaaagca cgtggcttaa acatttctaa cgtacctgca 300

tactcaccaa atgcgattgc tgaattatca gtaacgcaat tgatgcaatt attacgtcaa 360

accccattgt tcaataagaa gttagctaag caagacttcc gttgggcacc agatattgcc 420

aaggaattaa acaccatgac tgttggtgtt atcggtactg gtcggattgg ccgtgctgcc 480

atcgatattt tcaaaggctt cggcgctaag gttatcggtt acgatgttta ccggaatgct 540

gaacttgaaa aggaaggcat gtacgttgac accttggacg aattatacgc ccaagctgat 600

gttatcacgt tacacgttcc tgcattgaag gataactacc acatgttgaa tgcggatgcc 660

ttcagcaaga tgaaagatgg cgcctacatc ttgaactttg ctcgtgggac actcatcgat 720

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actgaaactg ccgttcacaa catggtgcac gtttcaatga acagtaacaa acaattcatc 960

gaaactggta aagctgatac gcaagttaag tttgactaa 999

<210> 27

<211> 981
<212> DNA
<213> Lactobacillus casei ldh1

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ggttcaagtt atgcctacgc aatggttttg caaggtatcg ctcaggaaat cggaatcgtt 120

gacattttca aggacaagac aaagggtgac gcgattgact tgagcaacgc gctcccattc 180

acaagtccta agaagattta ttcagctgaa tacagcgatg ctaaggatgc tgatctggtt 240

gttatcacag ctggcgctcc tcagaagcct ggcgaaactc gtttggactt ggttaacaag 300

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tccattgctg aaatggttaa tgttgacgct cgttcggtcc acgcttacat catgggcgaa 540

catggtgaca ctgaattccc tgtatggtcc cacgctaaca ttggtggcgt taccatcgct 600

gaatgggtta aggctcatcc agaaatcaag gaagacaagc ttgttaagat gtttgaagac 660

gttcgtgacg ccgcttatga aatcatcaaa ctcaagggtg cgaccttcta tggtatcgca 720

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tccgtttaca tggatggtca atatggcttg aacgacatct acatcggtac cccagctgtg 840

atcaaccgta atggtatcca gaacatcctg gaaatcccat tgaccgatca cgaagaagaa 900

tccatgcaga aatctgcttc tcaattgaag aaggttctga ccgatgcttt cgctaagaat 960

gacatcgaaa ctcgtcagta a 981

<210> 28
<211> 939
<212> DNA
<213> Lactobacillus casei ldh2

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cgcgtgcaag gtgacgtcga agatctttct gattccctac cttacacgtc acagaagaat 180

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aaagaaatca cacataacat tatggcaagc gggttcaatg ggtttattct agtcgcatcc 360

aatccagtcg atgtccttgc cgaattagtc ttgcaagaat ccggcttgcc acgtaatcag 420

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tttccagttt gggactacac caacattggc ggcaaaccga ttcttgattg gattcctaaa 600

gatcgccagg ataaagatct gcctgatatt agcgagcgcg tcaaaacggc tgcttatggc 660

atcattgaga aaaaaggtgc cactttctac ggcattgctg cctcattaac ccgtttaacc 720

agcgccttct tgaatgatga tcgcgcagca ttcgcaatgt ccgtccattt ggaaggcgaa 780

tacggcttgt caggtgtttc catcggtgta ccggtaatcc tcggcgctaa tggcttagaa 840

cgcatcattg agctggattt gaacccagaa gatcataagc ggttagccga ttctgcagct 900

attttgaaag aaaatctgaa gaaggctcaa gaagcttaa 939

<210> 29
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<213> Lactobacillus rhamnosus LGG_02523

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gacattttca aggacaagac gaaaggtgac gcaattgatt taagcaacgc gctcccattc 180

accagtccta agaagattta ttctgctgaa tacagcgatg ccaaggatgc tgatctggtt 240

gttatcactg ctggtgctcc tcaaaagcct ggcgaaactc gcttggatct ggttaacaag 300

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gaatgggtta aagcacatcc agaaatcaaa gaagacaaac ttgttaagat gtttgaagac 660

gttcgtgacg ctgcttacga aatcatcaaa ctcaagggtg caaccttcta cggtatcgca 720

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atcaaccgca atggtattca gaacattctg gaaatcccat tgaccgacca cgaagaagaa 900

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gacatcgaaa cacgtcagta a 981

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<212> DNA
<213> Lactobacillus rhamnosus LGG_00606

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aaagaaatca cgcacaatat catggccagt ggttttaatg gttttattct cgttgcctca 360

aacccggtcg acgtgctcgc ggaattagtg ctggaagaat cggggctgcc gcgtaaccaa 420

gtactaggct caggtacagc gctggattca gcccgtctgc gttcggaaat cggcttgcgt 480

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tatggtttgt caggtgtctc cattggggta ccggttatcc tcggcgcaaa cggcttagaa 840

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attttgaaag ataatttaaa gaaggcacag gaagcctag 939

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<212> PRT
<213> *Lactobacillus delbrueckii ldhA*

<400> 31

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20 25 30

Asp Lys Leu Leu Thr Pro Glu Thr Val Ala Leu Ala Lys Gly Ala Asp
35 40 45

Gly Val Val Val Tyr Gln Gln Leu Asp Tyr Thr Ala Glu Thr Leu Gln
50 55 60

Ala Leu Ala Asp Asn Gly Ile Thr Lys Met Ser Leu Arg Asn Val Gly
65 70 75 80

Val Asp Asn Ile Asp Met Ala Lys Ala Lys Glu Leu Gly Phe Gln Ile
85 90 95

Thr Asn Val Pro Val Tyr Ser Pro Asn Ala Ile Ala Glu His Ala Ala
100 105 110

Ile Gln Ala Ala Arg Ile Leu Arg Gln Asp Lys Ala Met Asp Glu Lys
115 120 125

Val Ala Arg His Asp Leu Arg Trp Ala Pro Thr Ile Gly Arg Glu Val
130 135 140

Arg Asp Gln Val Val Gly Val Ile Gly Thr Gly His Ile Gly Gln Val
145 150 155 160

Phe Met Gln Ile Met Glu Gly Phe Gly Ala Lys Val Ile Ala Tyr Asp
165 170 175

Ile Phe Arg Asn Pro Glu Leu Glu Lys Lys Gly Tyr Tyr Val Asp Ser
180 185 190

Leu Asp Asp Leu Tyr Lys Gln Ala Asp Val Ile Ser Leu His Val Pro
195 200 205

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Asp Val Pro Ala Asn Val His Met Ile Asn Asp Glu Ser Ile Ala Lys
    210                 215                 220

Met Lys Gln Asp Val Val Ile Val Asn Val Ser Arg Gly Pro Leu Val
225                 230                 235                 240

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

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

Trp Glu Gly Lys Glu Phe Pro Asp Ala Arg Leu Ala Asp Leu Ile Ala
        275                 280                 285

Arg Pro Asn Val Leu Val Thr Pro His Thr Ala Phe Tyr Thr Thr His
    290                 295                 300

Ala Val Arg Asn Met Val Val Lys Ala Phe Asp Asn Asn Leu Glu Leu
305                 310                 315                 320

Val Glu Gly Lys Glu Ala Glu Thr Pro Val Lys Val Gly
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Glu Leu Leu Thr Glu Asp Asn Val Asp Leu Ala Lys Gly Phe Asp Gly
         35                  40                  45

Ala Asp Val Tyr Gln Gln Lys Asp Tyr Thr Ala Glu Val Leu Asn Lys
     50                  55                  60

Leu Ala Asp Glu Gly Val Lys Asn Ile Ser Leu Arg Asn Val Gly Val
 65                  70                  75                  80

Asp Asn Leu Asp Val Pro Thr Val Lys Ala Arg Gly Leu Asn Ile Ser
                 85                  90                  95

Asn Val Pro Ala Tyr Ser Pro Asn Ala Ile Ala Glu Leu Ser Val Thr
            100                 105                 110

Gln Leu Met Gln Leu Leu Arg Gln Thr Pro Leu Phe Asn Lys Lys Leu
        115                 120                 125

Ala Lys Gln Asp Phe Arg Trp Ala Pro Asp Ile Ala Lys Glu Leu Asn
    130                 135                 140

Thr Met Thr Val Gly Val Ile Gly Thr Gly Arg Ile Gly Arg Ala Ala
145                 150                 155                 160

Ile Asp Ile Phe Lys Gly Phe Gly Ala Lys Val Ile Gly Tyr Asp Val
                165                 170                 175

Tyr Arg Asn Ala Glu Leu Glu Lys Glu Gly Met Tyr Val Asp Thr Leu
            180                 185                 190

Asp Glu Leu Tyr Ala Gln Ala Asp Val Ile Thr Leu His Val Pro Ala
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195 200 205

Leu Lys Asp Asn Tyr His Met Leu Asn Ala Asp Ala Phe Ser Lys Met
210 215 220

Lys Asp Gly Ala Tyr Ile Leu Asn Phe Ala Arg Gly Thr Leu Ile Asp
225 230 235 240

Ser Glu Asp Leu Ile Lys Ala Leu Asp Ser Gly Lys Val Ala Gly Ala
245 250 255

Ala Leu Asp Thr Tyr Glu Tyr Glu Thr Lys Ile Phe Asn Lys Asp Leu
260 265 270

Glu Gly Gln Thr Ile Asp Asp Lys Val Phe Met Asn Leu Phe Asn Arg
275 280 285

Asp Asn Val Leu Ile Thr Pro His Thr Ala Phe Tyr Thr Glu Thr Ala
290 295 300

Val His Asn Met Val His Val Ser Met Asn Ser Asn Lys Gln Phe Ile
305 310 315 320

Glu Thr Gly Lys Ala Asp Thr Gln Val Lys Phe Asp
325 330