Figure 1A

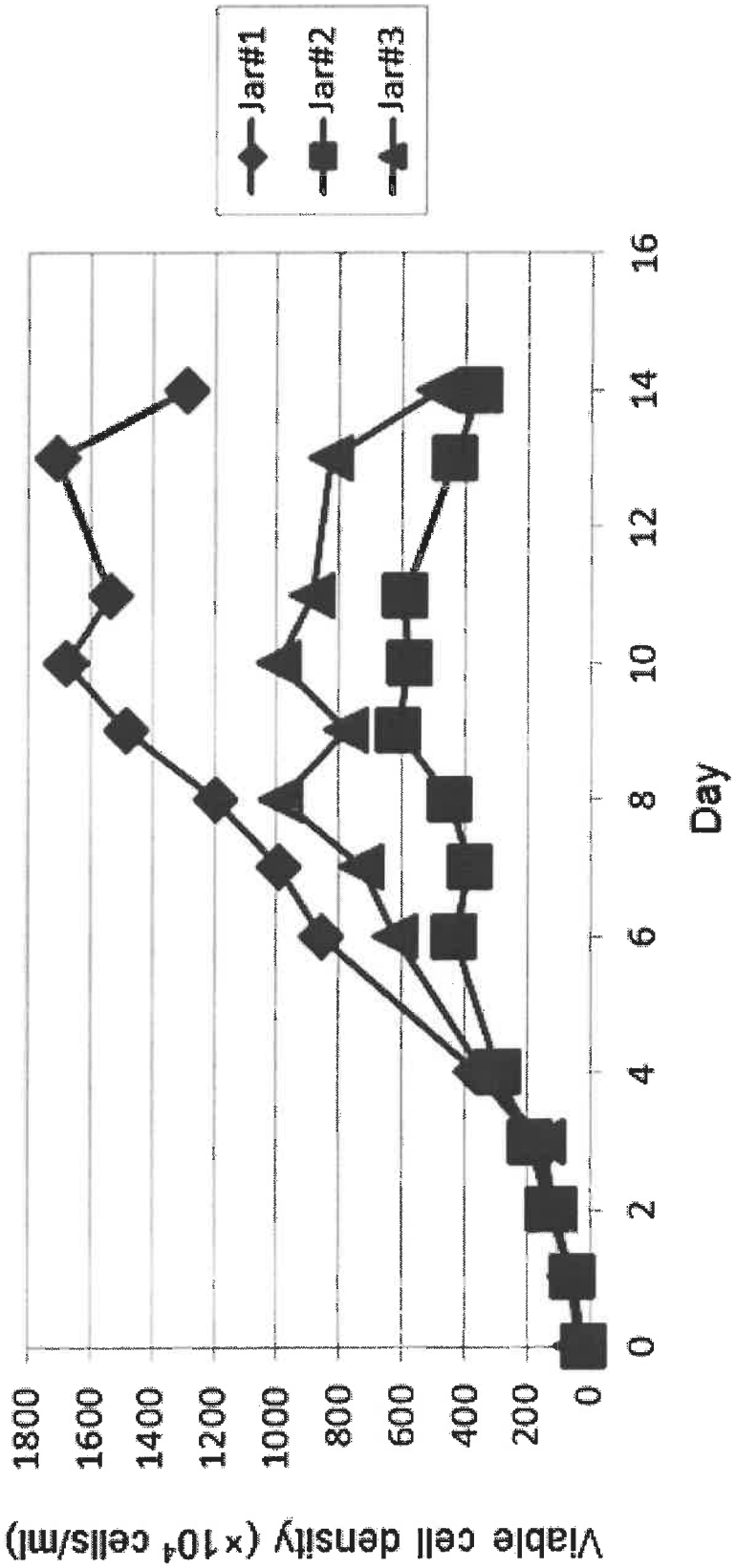

Jar#1
Jar#2
Jar#3
Viable cell density (×10⁴ cells/ml)
1800
1600
1400
1200
1000
800
600
400
200
0
0
2
4
6
8
10
12
14
16
Day

Figure 1B

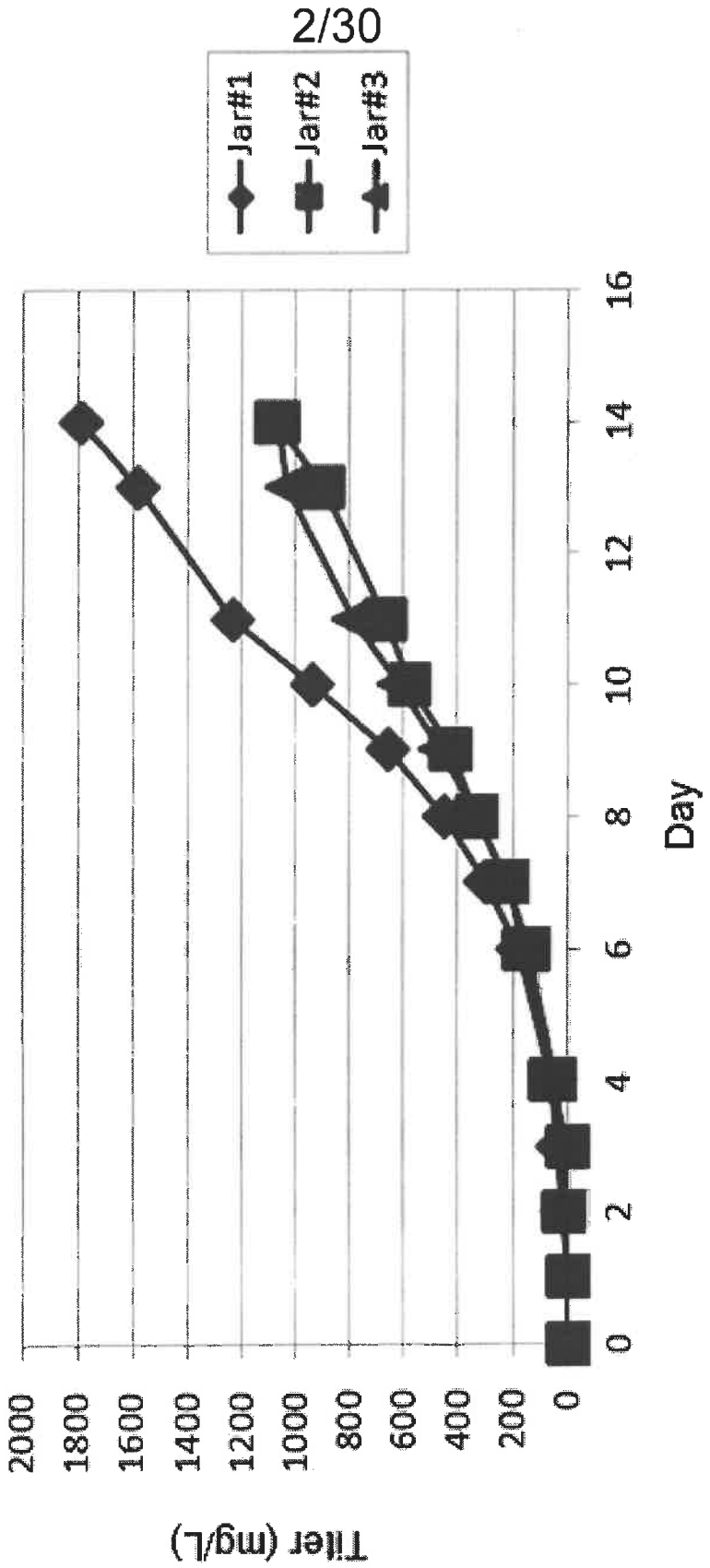

Jar#1
Jar#2
Jar#3
Tiler (mg/L)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
2
4
6
8
10
12
14
16
Day

Figure 2A

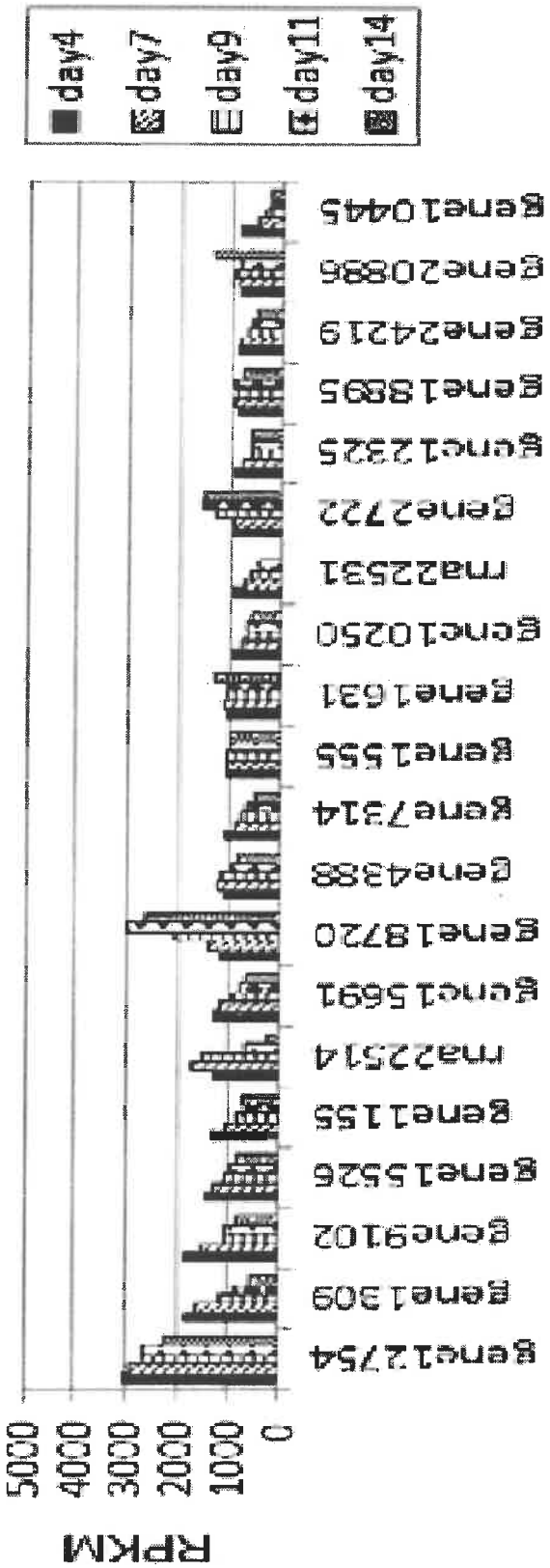

day4
day7
day9
day11
day14
gene1044S
gene20886
gene24219
gene18895
gene12325
gene2722
rna22531
gene10250
gene631
gene1555
gene7314
gene4388
gene18720
gene15691
rna22514
gene1155
gene15526
gene9102
gene1309
gene12754
5000
4000
3000
2000
1000
0
RPKM

Figure 2B

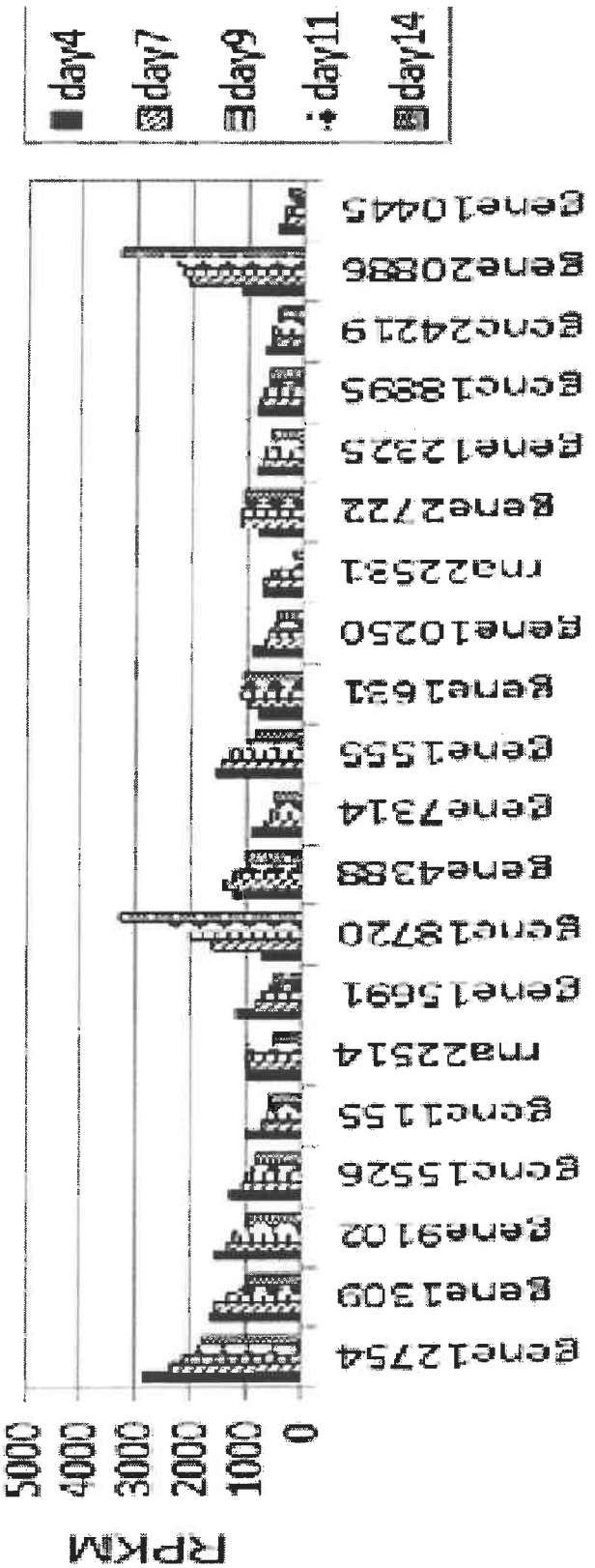

day4
day7
day9
day11
day14
RPKM
5000
4000
3000
2000
1000
0
gene1045
gene20886
gene24219
gene13895
gene2325
gene2722
rna22531
gene10250
gene1631
gene1555
gene7314
gene4388
gene18720
gene15691
rna22514
gene1155
gene15526
gene9102
gene1309
gene12754

Figure 2C

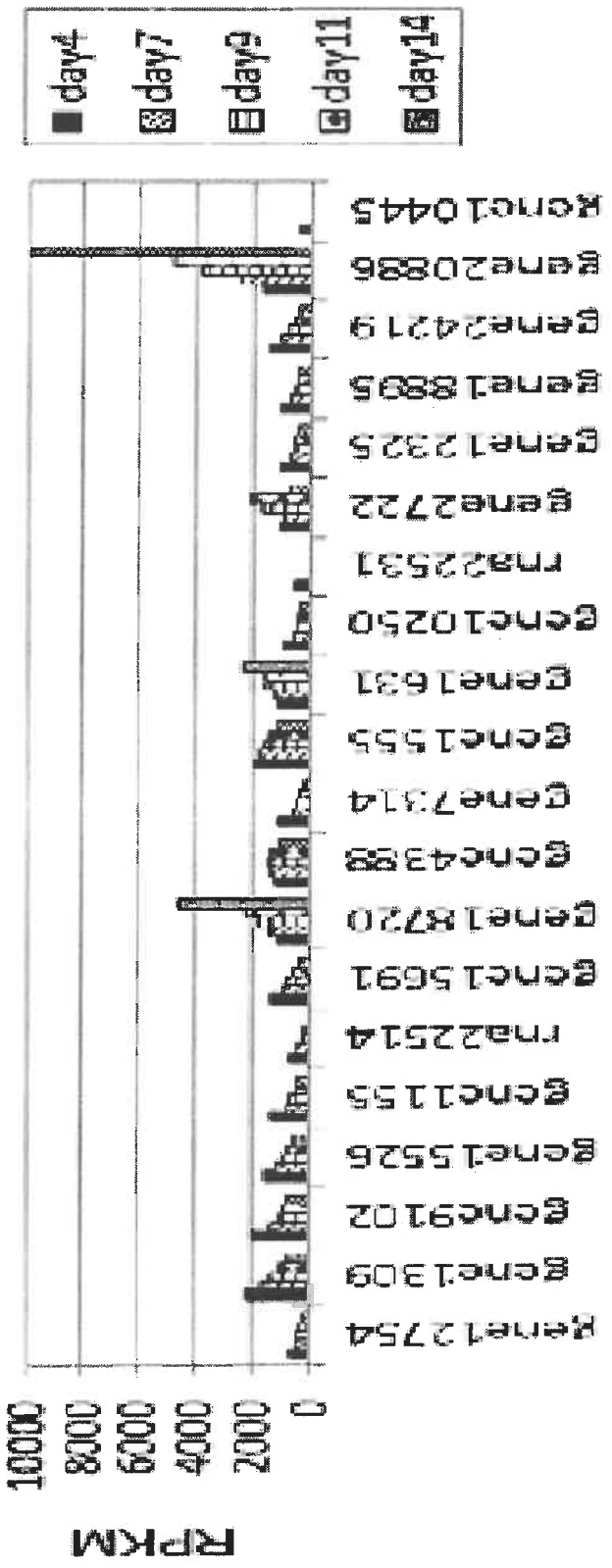

day4
day7
day9
day11
day14
RPKM
10000
8000
6000
4000
2000
0
Rene12754
gene1309
gene9102
gene15526
gene1155
rna22514
gene15091
gene1872O
gene4388
gene7314
gene1555
gene1631
gene10250
rna22531
gene2722
gene12325
gene1889S
gene24219
gene20886
Rene10445

Figure 3

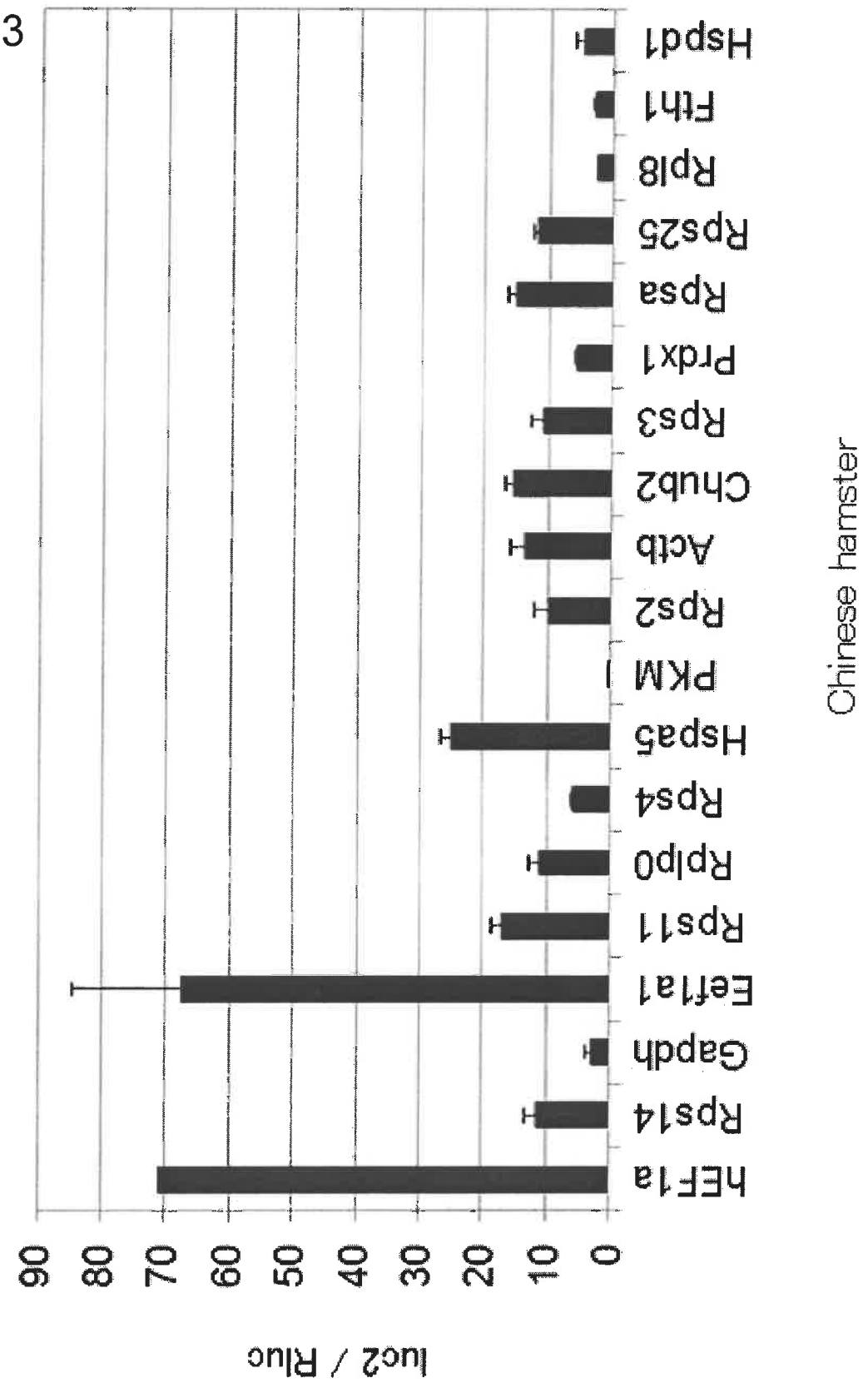

hEF1a
Rps14
Gapdh
Eef1a1
Rps11
Rplp0
Rps4
Hspa5
PKM
Rps2
Actb
Chub2
Rps3
Prdx1
Rpsa
Rps25
Rpl8
Fth1
Hspd1
0
10
20
30
40
50
60
70
80
90
luc2 / Rluc
Chinese hamster

Figure 4

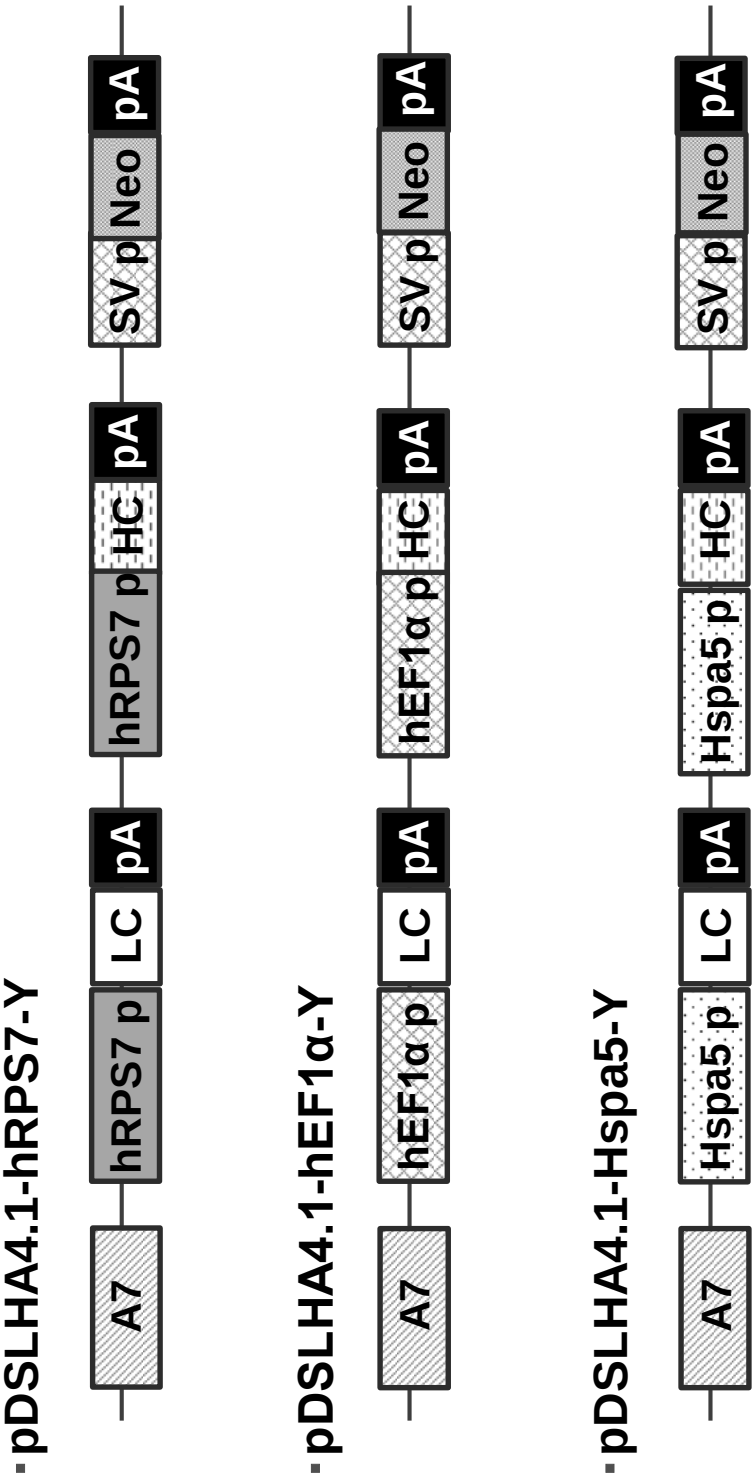

pDSLHA4.1-hRPS7-Y
A7
hRPS7 p
LC
pA
hRPS7 p
HC
pA
SV p
Neo
pA
pDSLHA4.1-hEF1α-Y
A7
hEF1α p
LC
pA
hEF1α p
HC
pA
SV p
Neo
pA
pDSLHA4.1-Hspa5-Y
A7
Hspa5 p
LC
pA
Hspa5 p
HC
pA
SV p
Neo
pA

Figure 5A

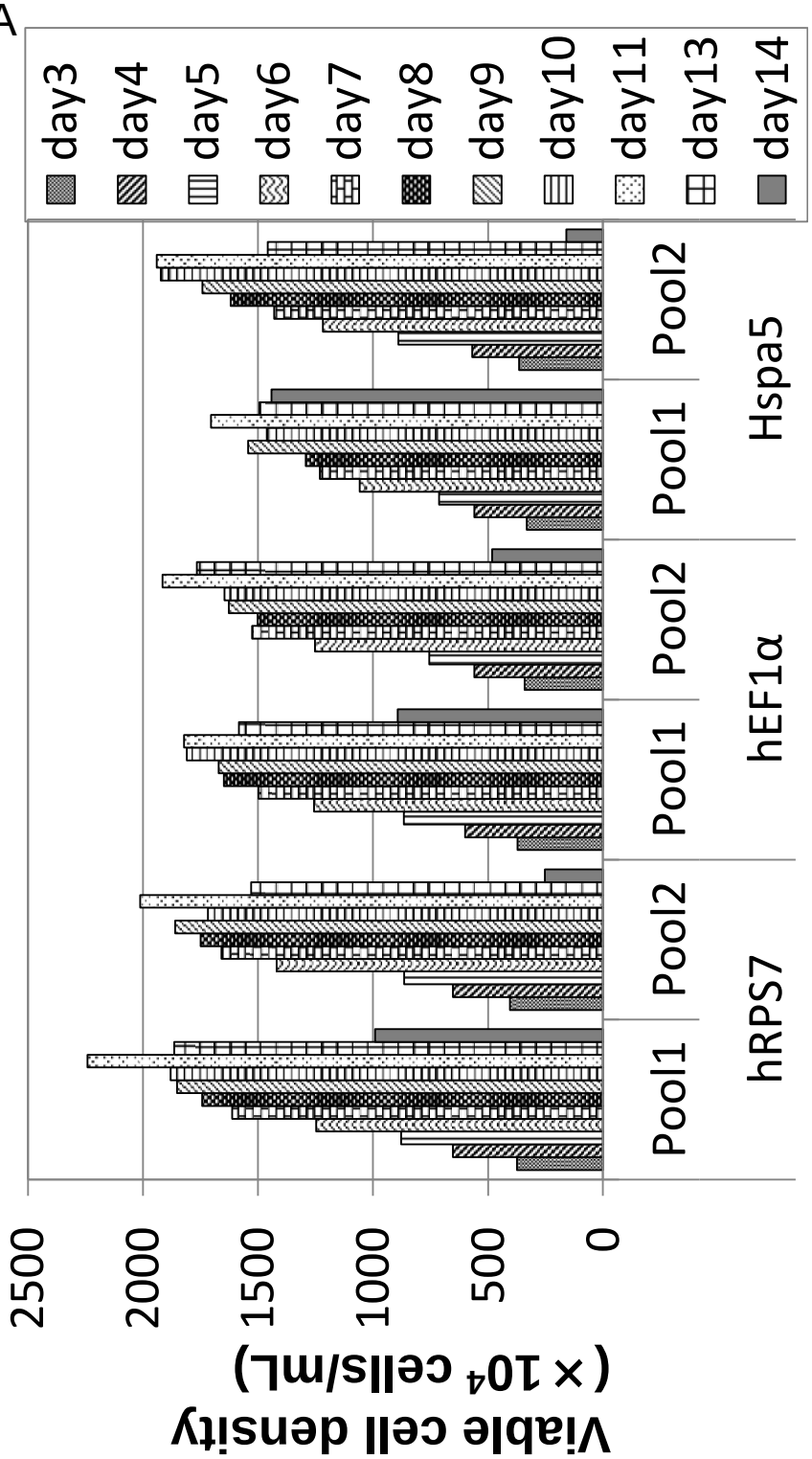

day3
day4
day5
day6
day7
day8
day9
day10
day11
day13
day14
Viable cell density
(× 10⁴ cells/mL)
2500
2000
1500
1000
500
0
hRPS7
hEF1α
Hspa5
Pool1
Pool2
Pool1
Pool2
Pool1
Pool2

Figure 5B

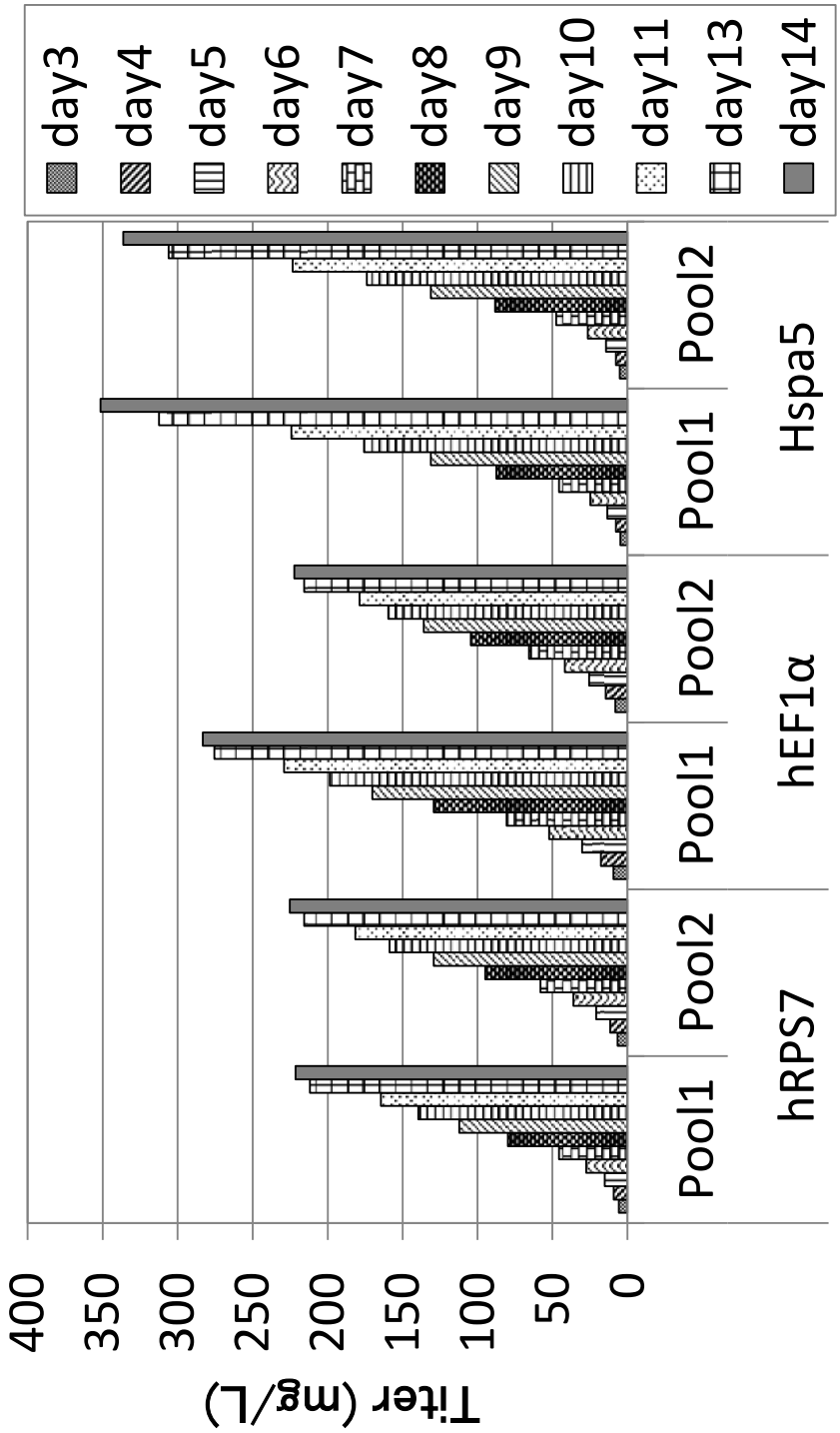

day3
day4
day5
day6
day7
day8
day9
day10
day11
day13
day14
Titer (mg/L)
400
350
300
250
200
150
100
50
0
hRPS7
Pool1
Pool2
hEF1α
Pool1
Pool2
Hspa5
Pool1
Pool2

Figure 5C

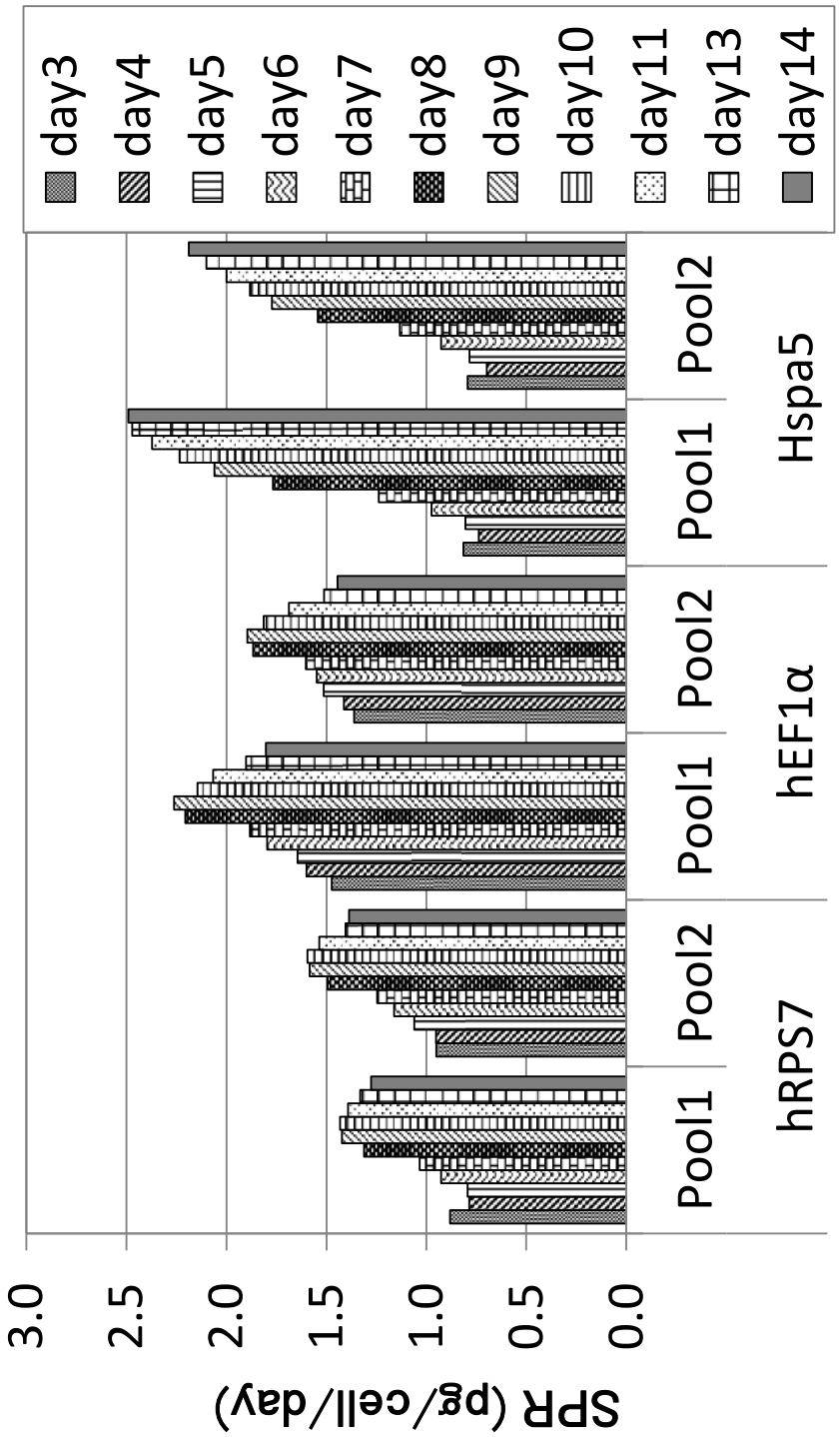

day3
day4
day5
day6
day7
day8
day9
day10
day11
day13
day14
Pool2
Pool1
Hspa5
Pool2
Pool1
hEF1α
Pool2
Pool1
hRPS7
3.0
2.5
2.0
1.5
1.0
0.5
0.0
SPR (pg/cell/day)

Figure 6

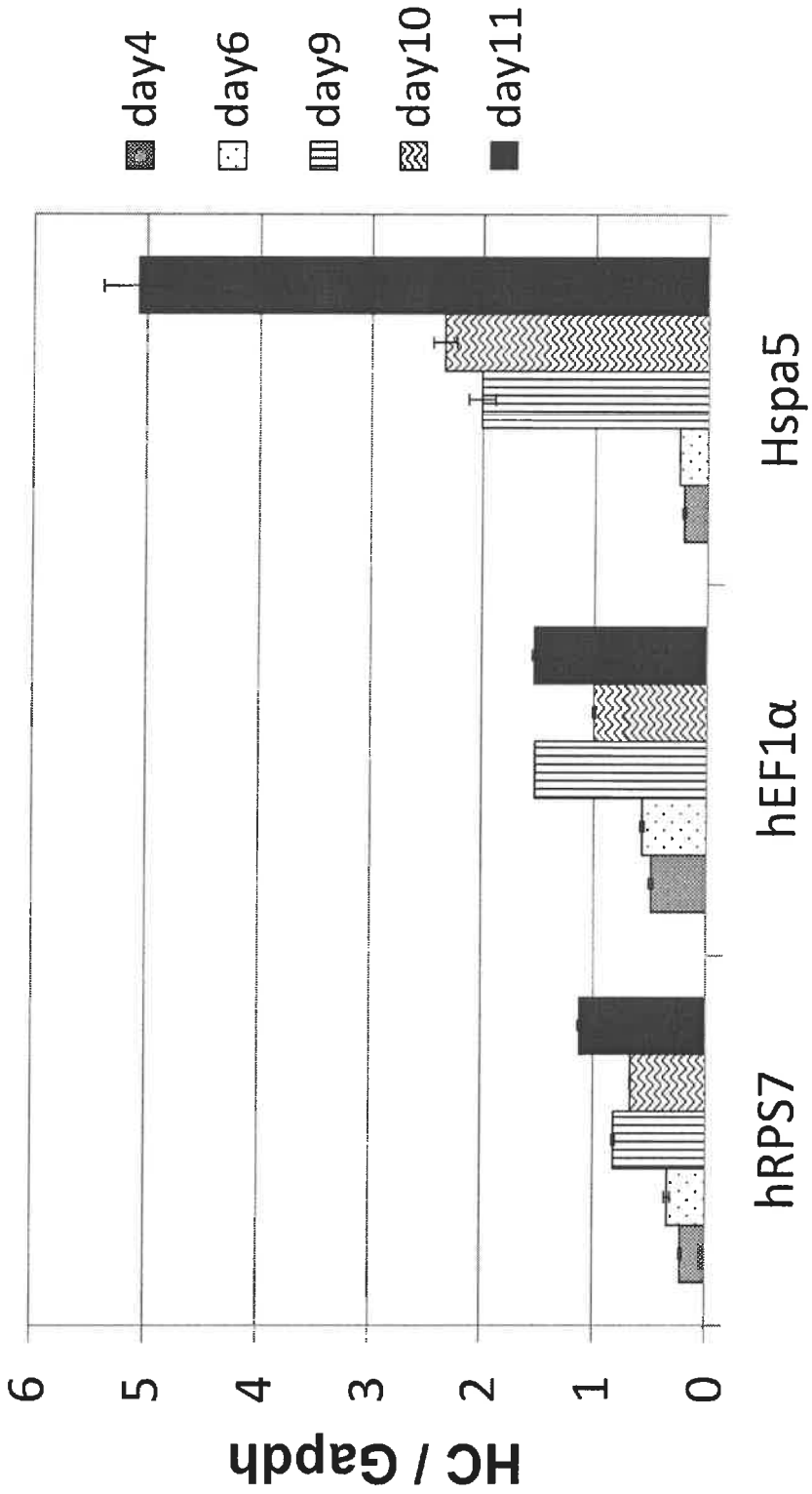

day4
day6
day9
day10
day11
Hspa5
hEF1α
hRPS7
HC / Gapdh
0
1
2
3
4
5
6

Figure 7A

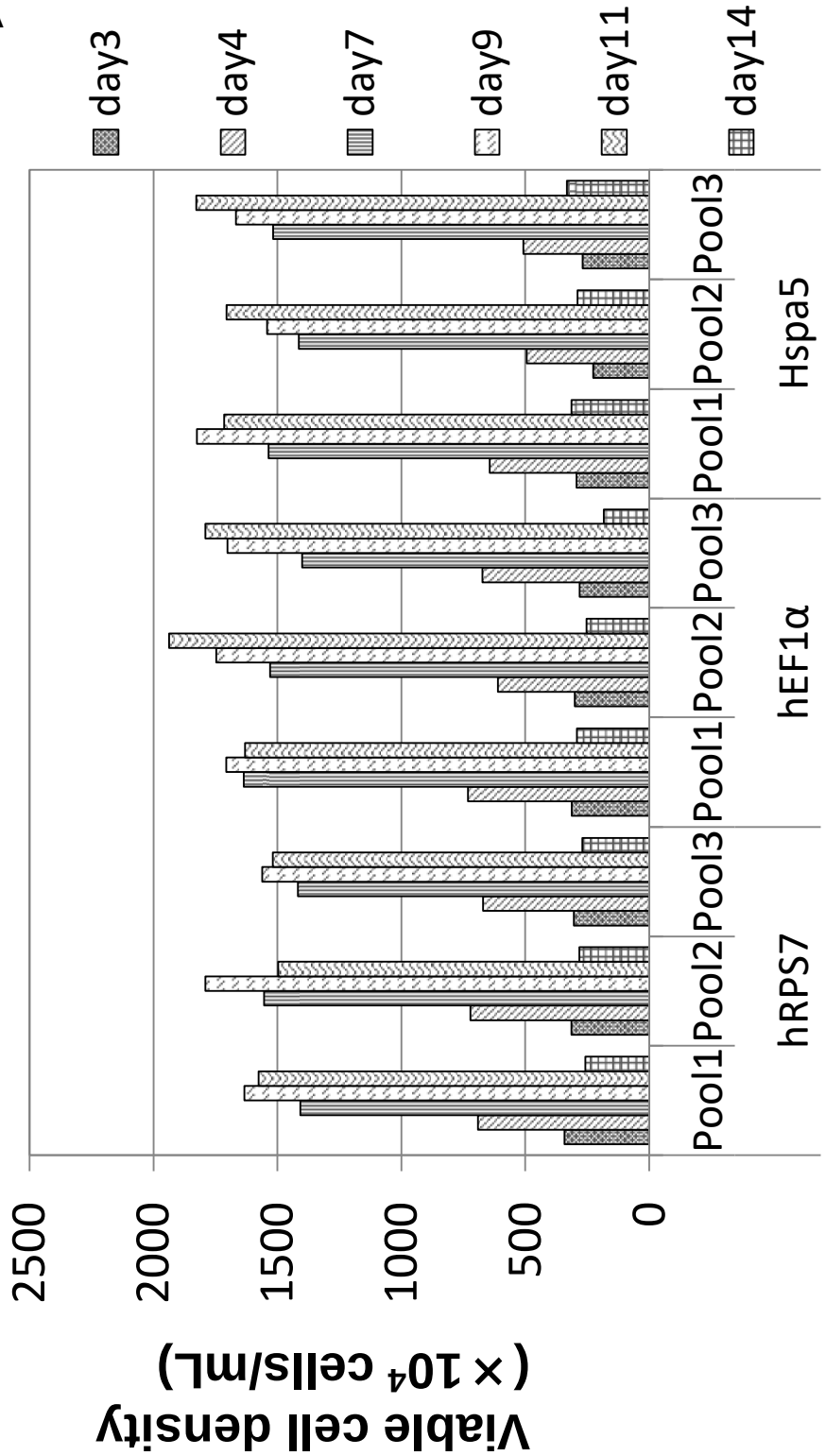

day3
day4
day7
day9
day11
day14
Viable cell density
(× 10⁴ cells/mL)
2500
2000
1500
1000
500
0
Pool1
Pool2
Pool3
hRPS7
Pool1
Pool2
Pool3
hEF1α
Pool1
Pool2
Pool3
Hspa5

Figure 7B

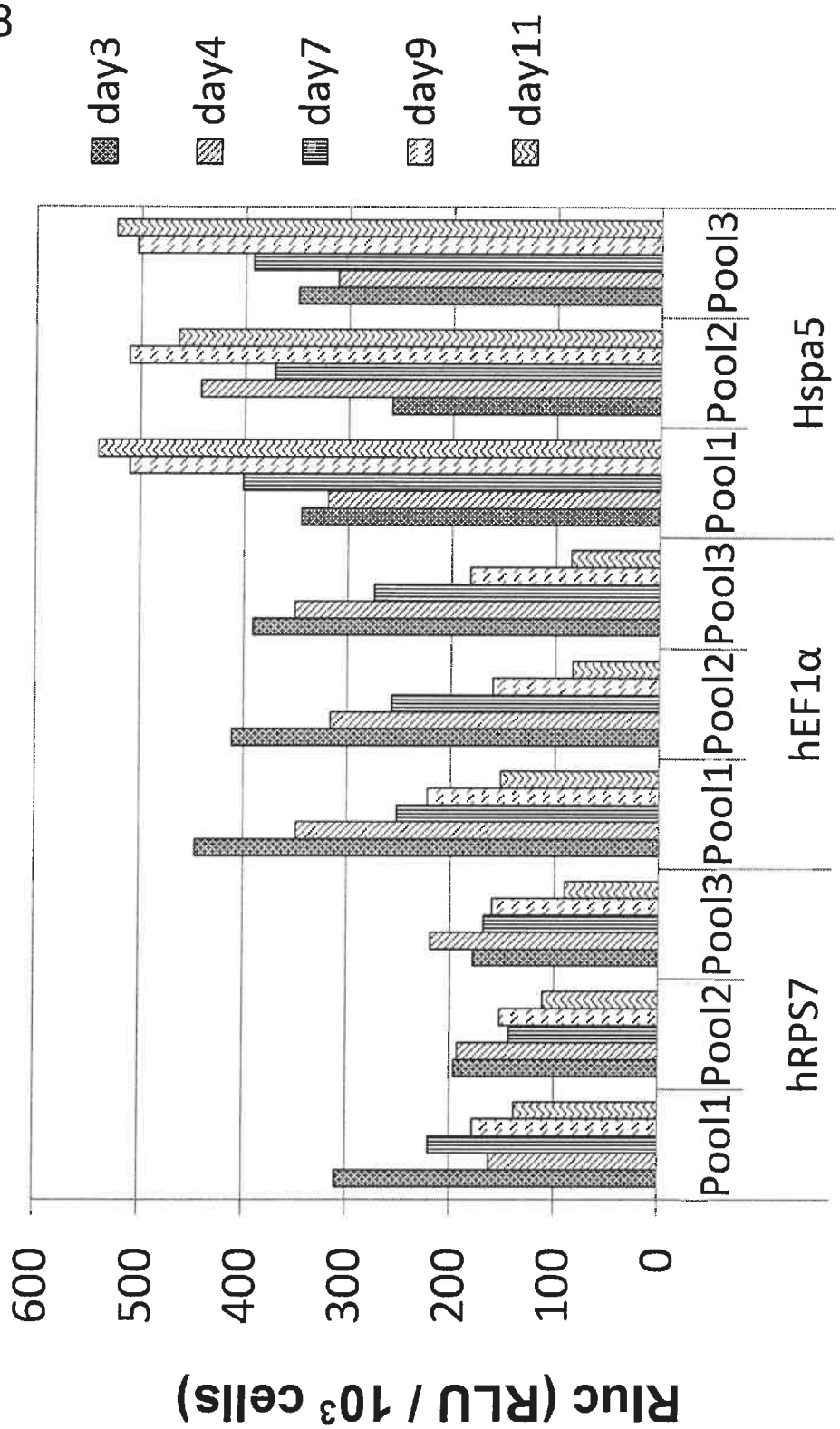

day3
day4
day7
day9
day11
Rluc (RLU / 10³ cells)
600
500
400
300
200
100
0
Pool1
Pool2
Pool3
hRPS7
Pool1
Pool2
Pool3
hEF1α
Pool1
Pool2
Pool3
Hspa5

Figure 8A

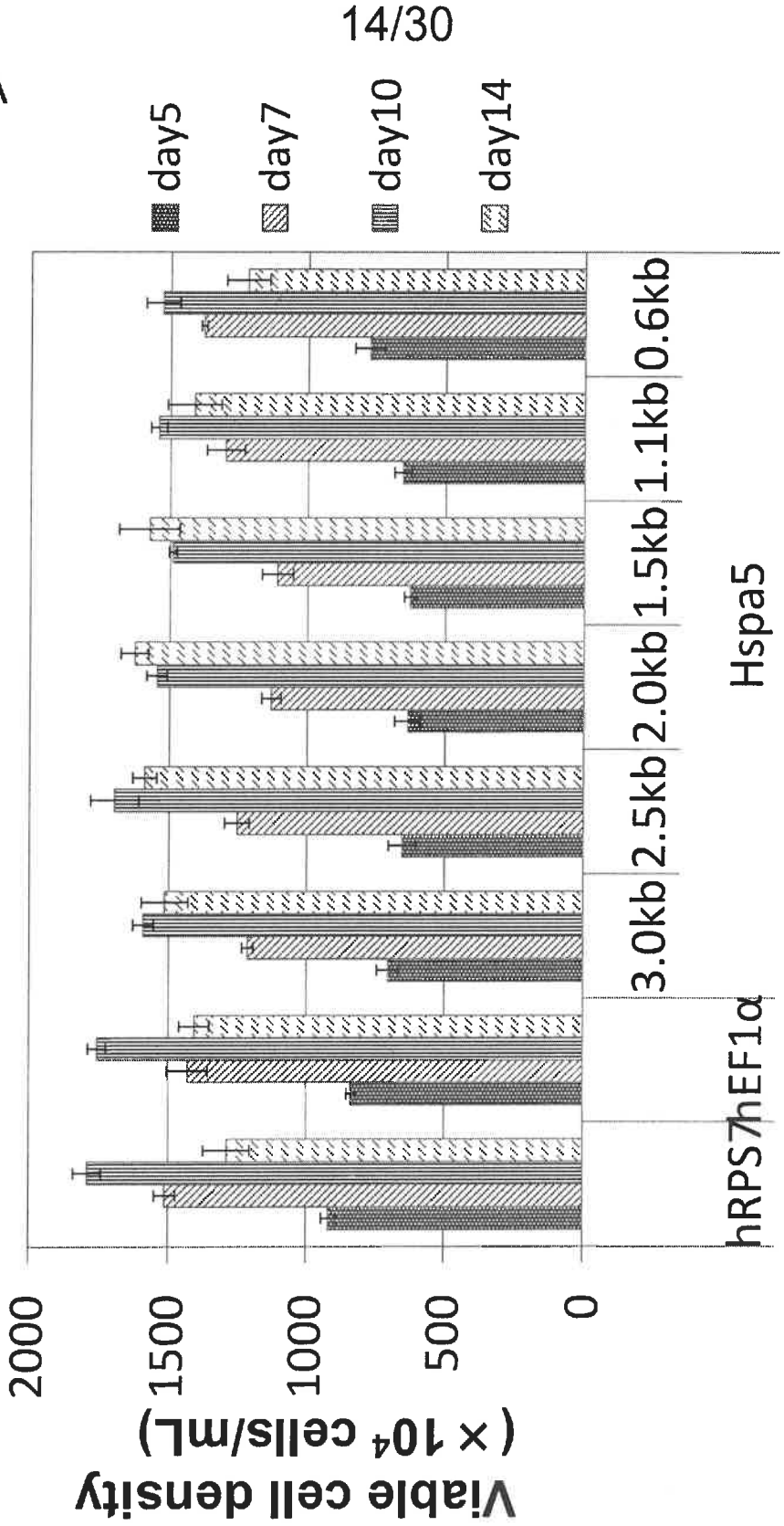

day5
day7
day10
day14
Viable cell density
(× 10⁴ cells/mL)
2000
1500
1000
500
0
hRPS7
hEF1α
3.0kb
2.5kb
2.0kb
1.5kb
1.1kb
0.6kb
Hspa5

Figure 8B

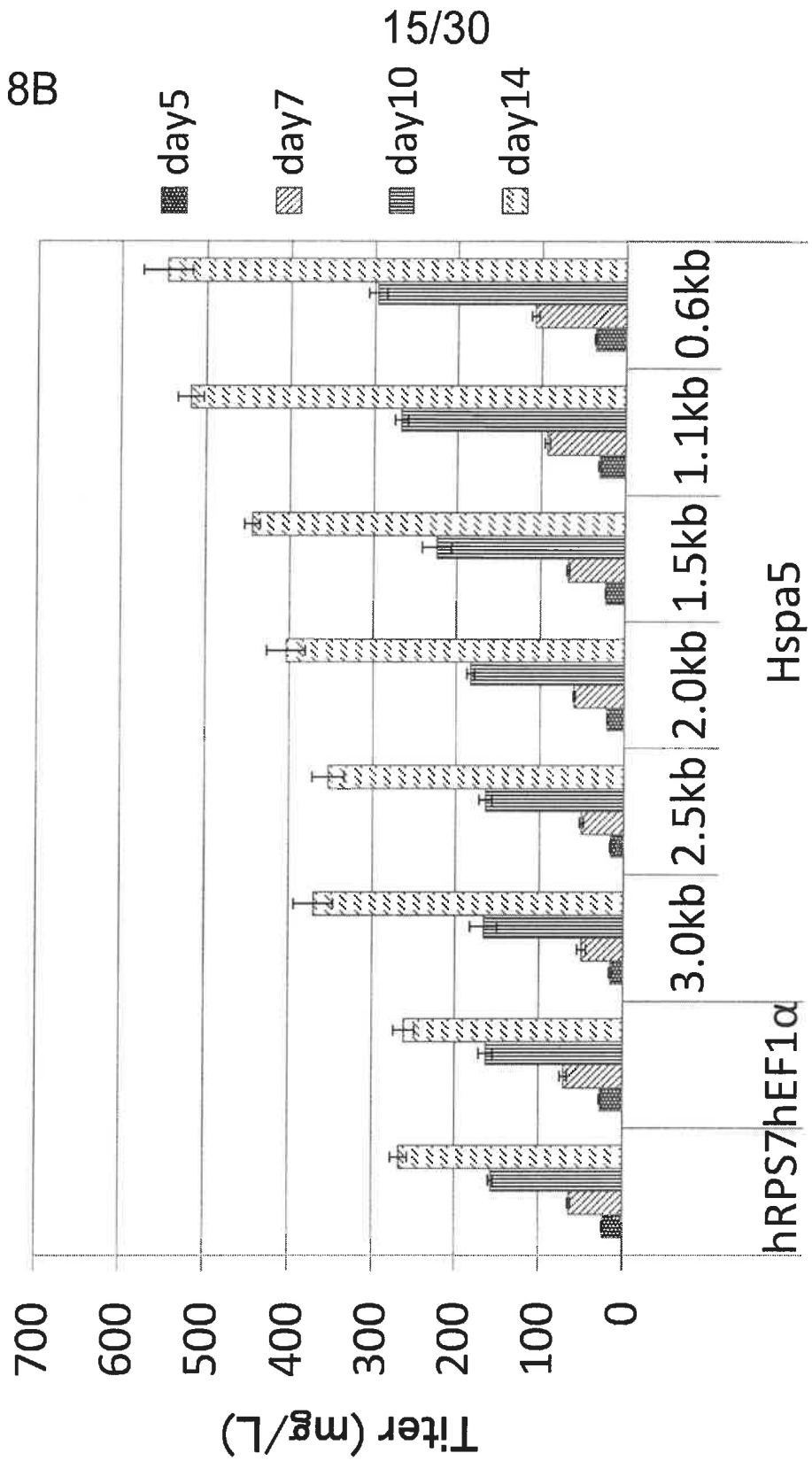

day5
day7
day10
day14
Titer (mg/L)
700
600
500
400
300
200
100
0
hRPS7hEF1α
3.0kb
2.5kb
2.0kb
1.5kb
1.1kb
0.6kb
Hspa5

Figure 8C

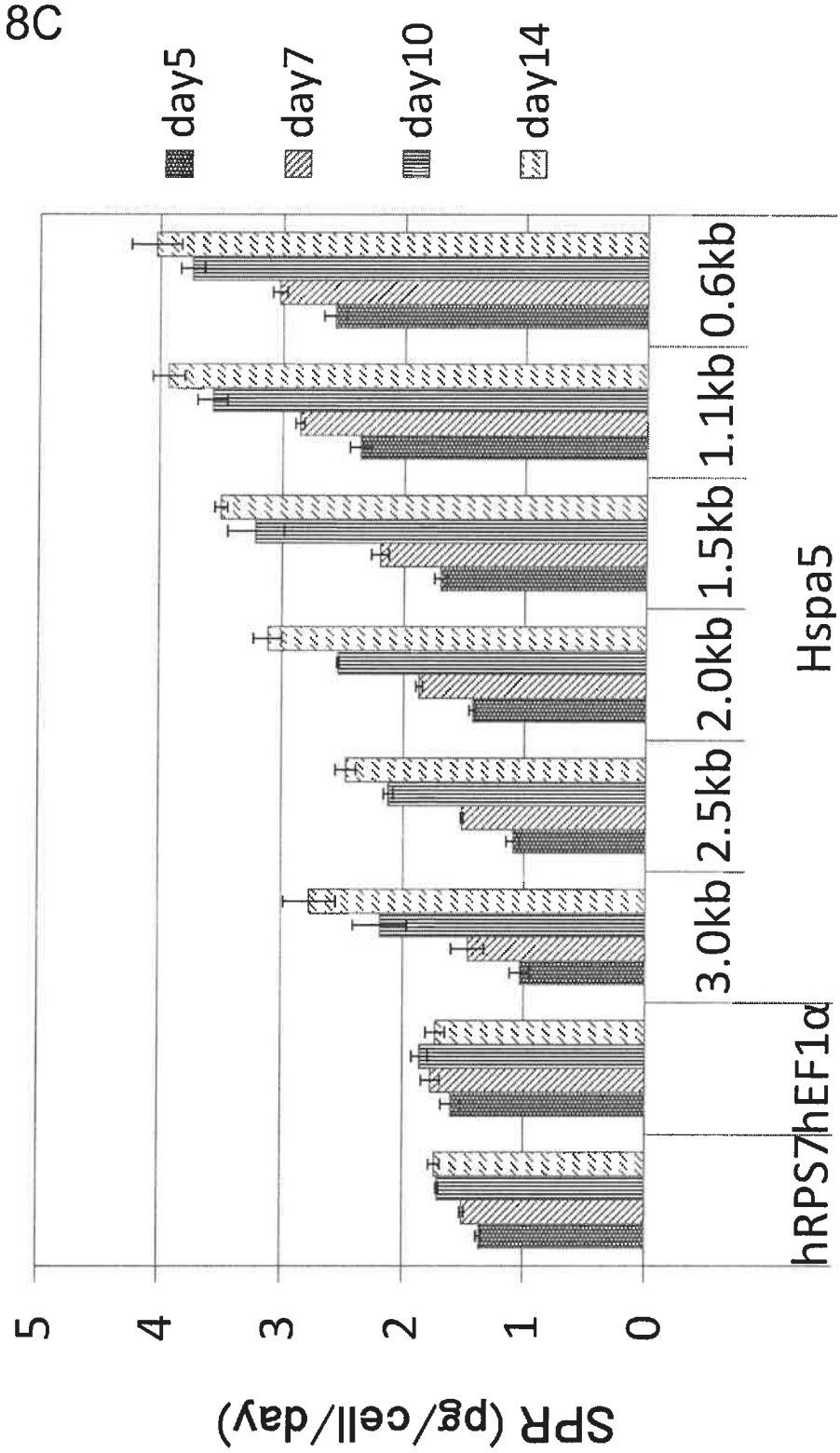

day5
day7
day10
day14
SPR (pg/cell/day)
0
1
2
3
4
5
hRPS7/hEF1α
3.0kb
2.5kb
2.0kb
1.5kb
1.1kb
0.6kb
Hspa5

Figure 9A

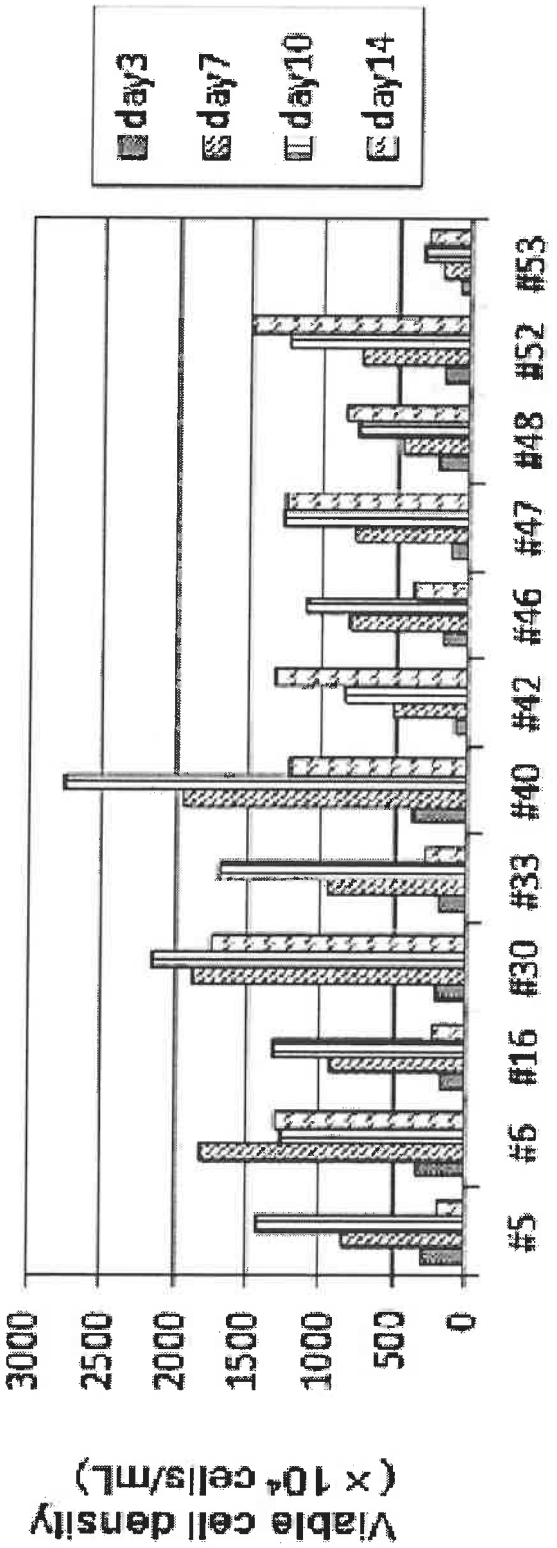

day3
day7
day10
day14
Viable cell density
(× 10⁴ cells/mL)
3000
2500
2000
1500
1000
500
0
#5
#6
#16
#30
#33
#40
#42
#46
#47
#48
#52
#53

Figure 9B

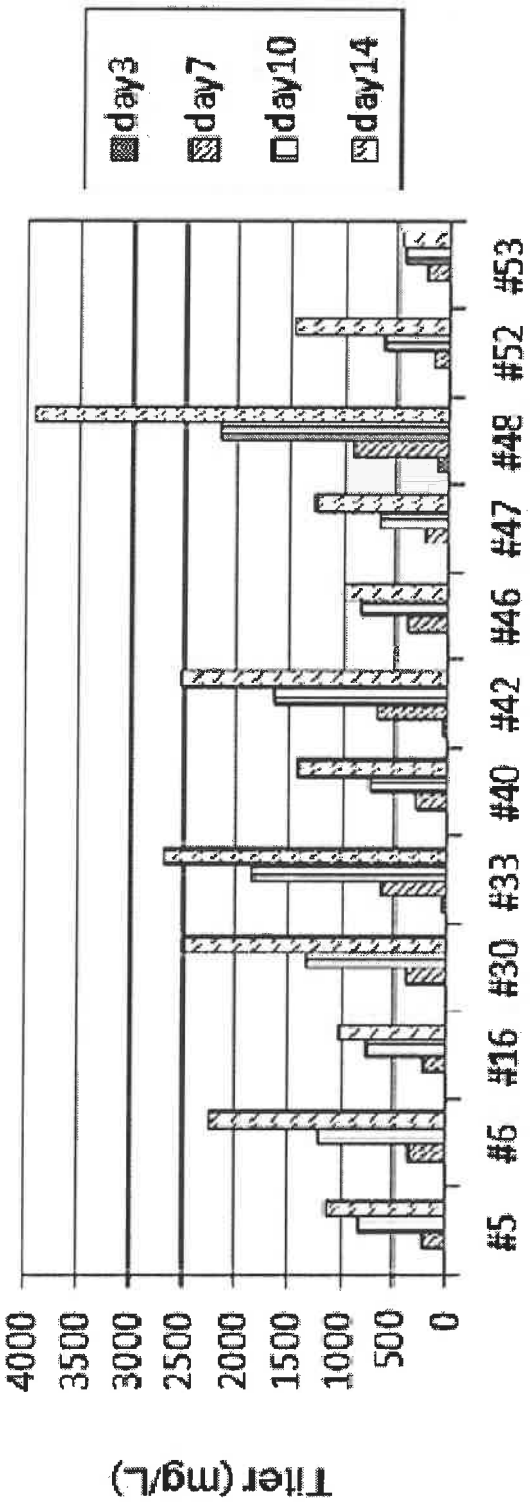

day3
day7
day10
day14
#5
#6
#16
#30
#33
#40
#42
#46
#47
#48
#52
#53
0
500
1000
1500
2000
2500
3000
3500
4000
Titer (mg/L)

Figure 9C

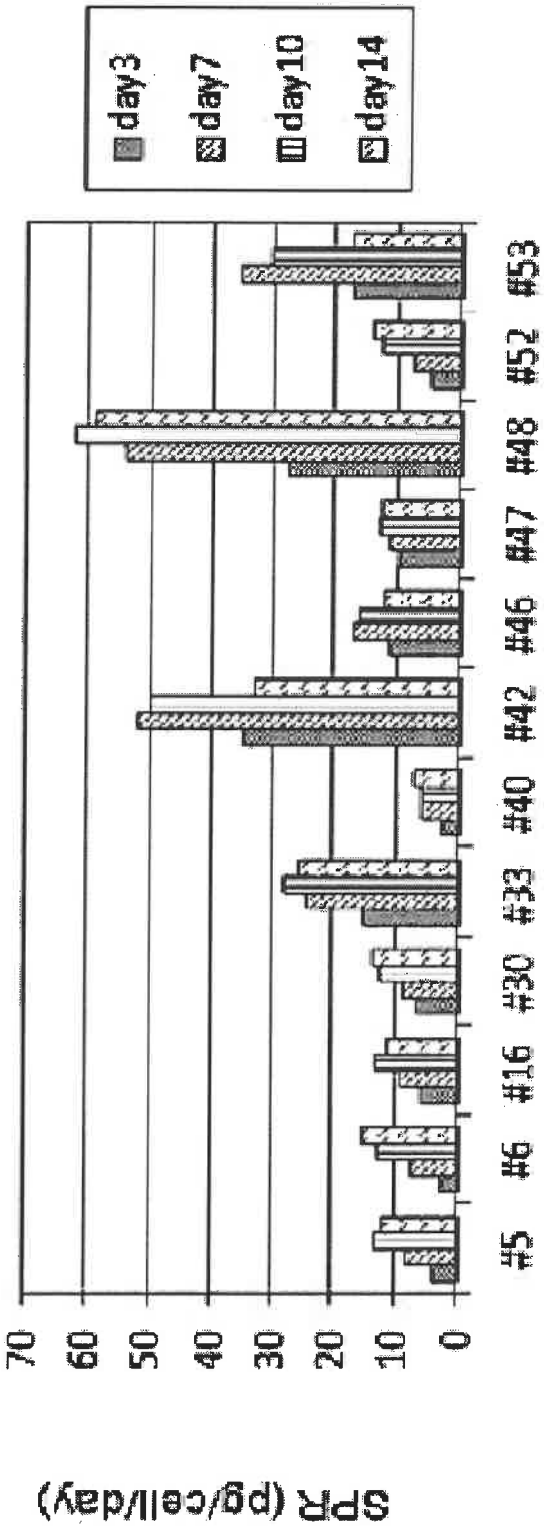

day3
day7
day10
day14
#5
#6
#16
#30
#33
#40
#42
#46
#47
#48
#52
#53
0
10
20
30
40
50
60
70
SPR (pg/cell/day)

Figure 10A

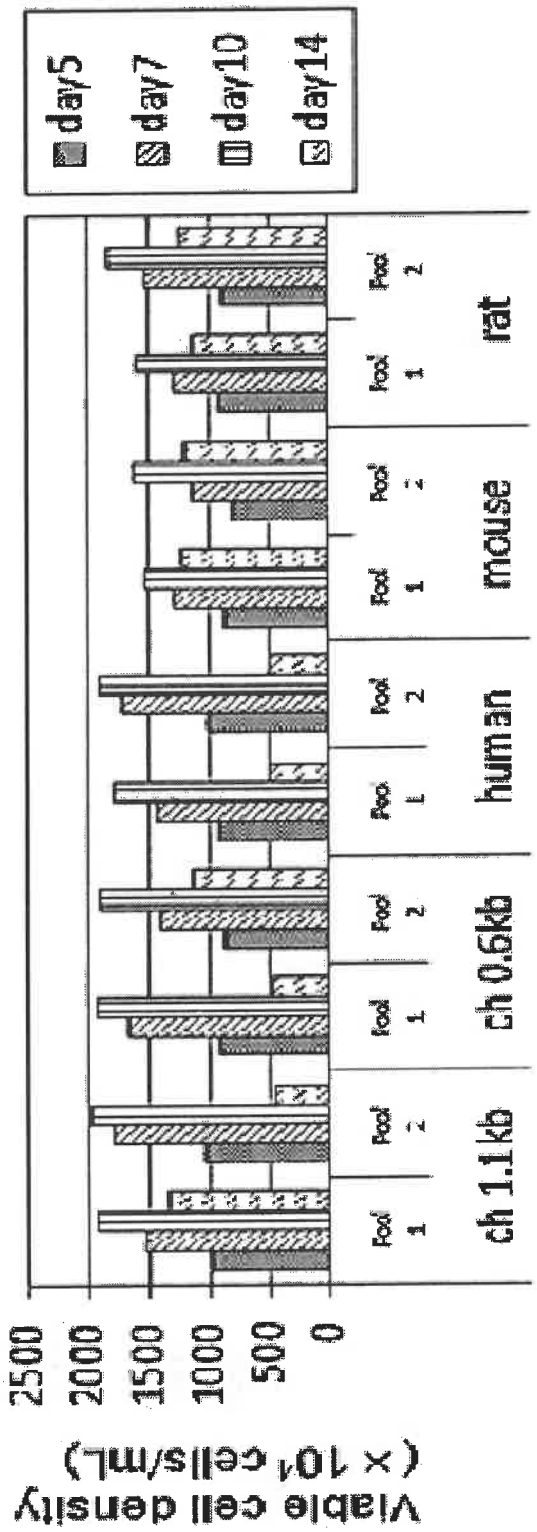

day5
day7
day10
day14
Viable cell density
(× 10⁴ cells/mL)
2500
2000
1500
1000
500
0
ch 1.1kb
ch 0.6kb
human
mouse
rat
Pool 1
Pool 2

Figure 10B

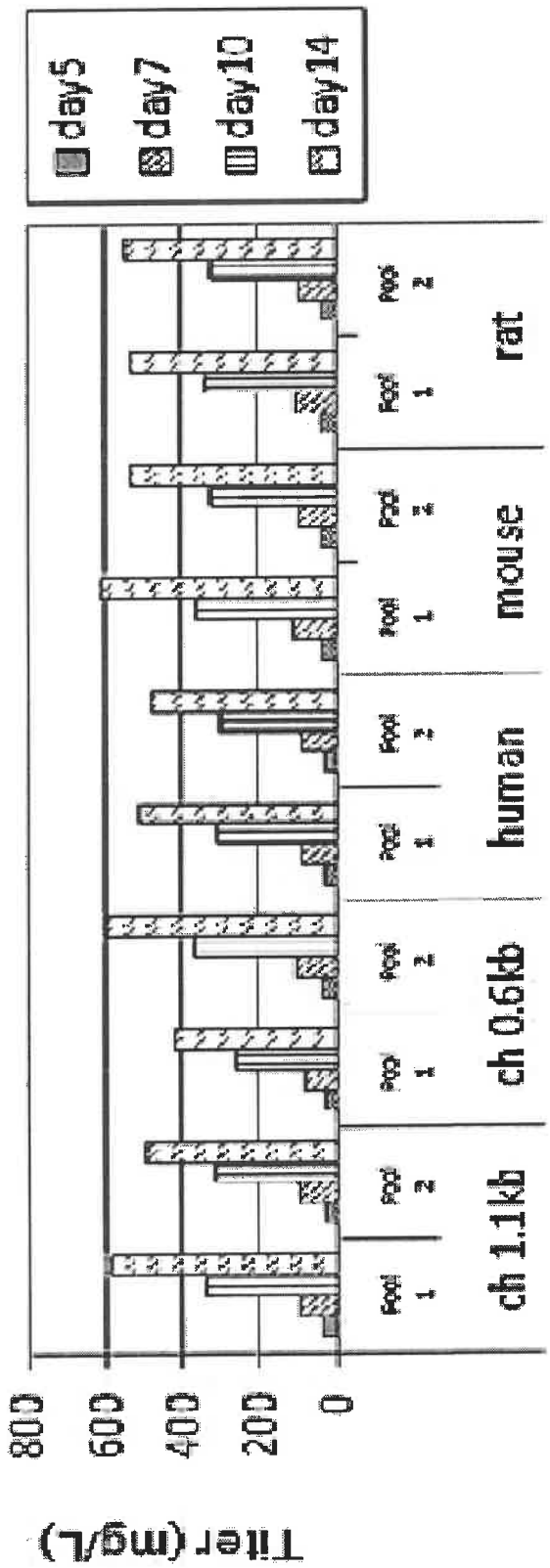

day5
day7
day10
day14
Titer (mg/L)
800
600
400
200
0
ch 1.1kb
ch 0.6kb
human
mouse
rat
Pool 1
Pool 2

Figure 10C

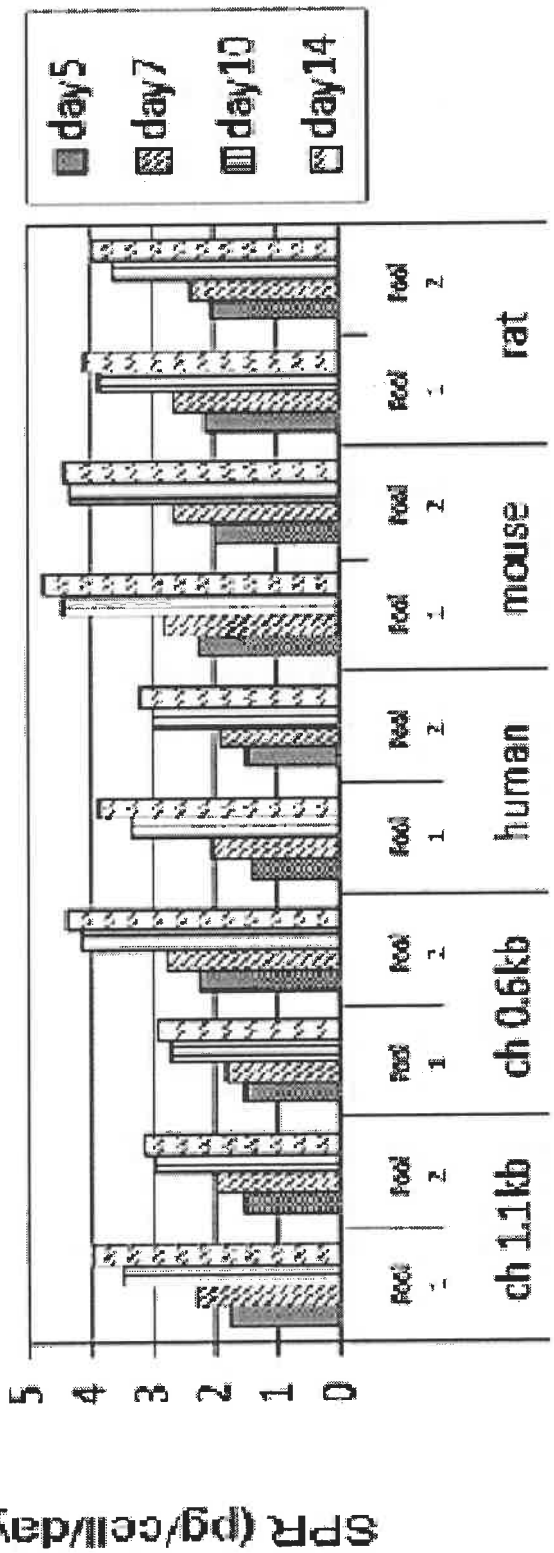

day5
day7
day10
day14
rat
mouse
human
ch 0.6kb
ch 1.1kb
Rad -
Rad 1
Rad 2
5
4
3
2
1
0
SPR (pg/cell/day)

Figure 11A

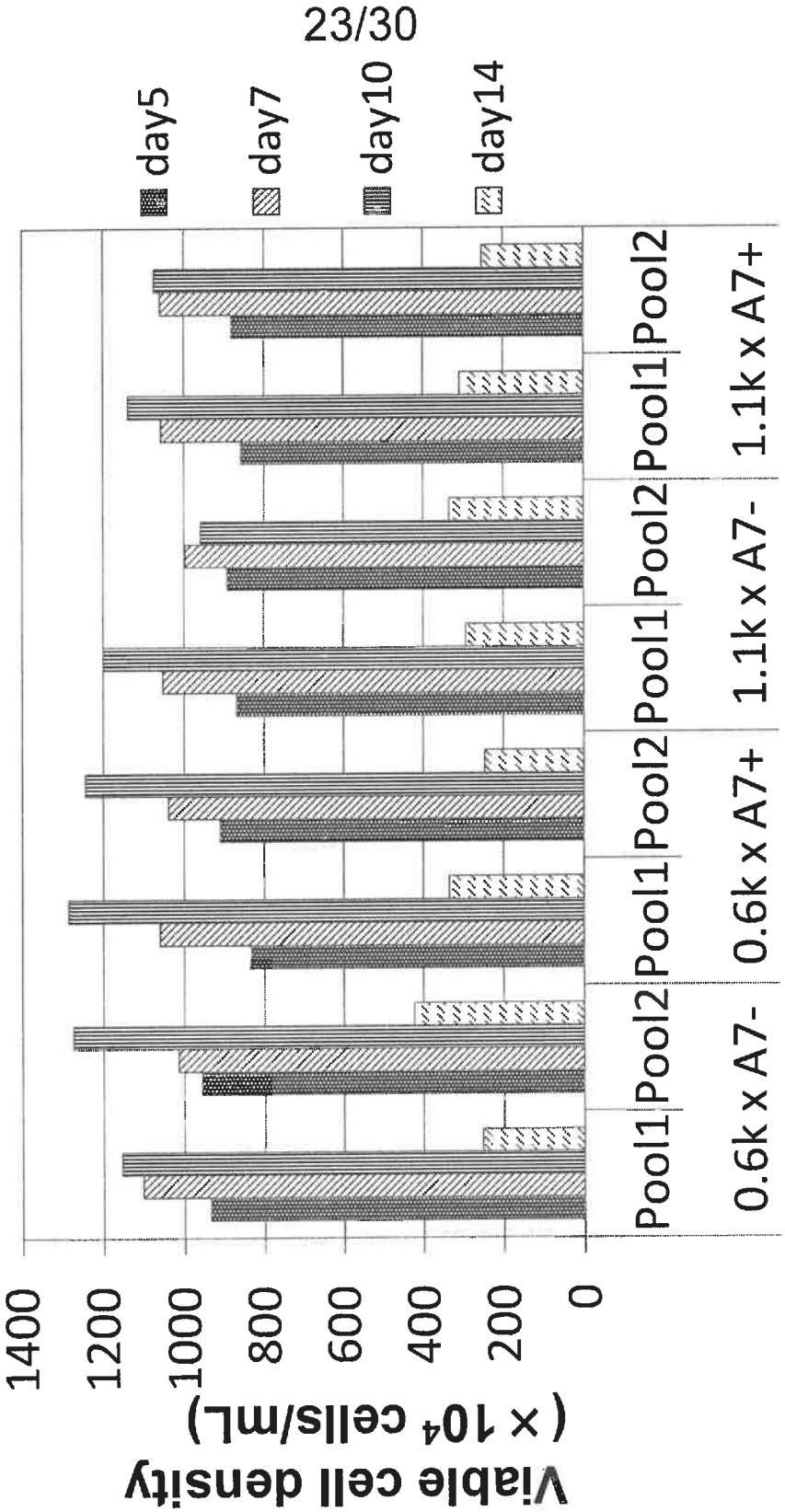

day5
day7
day10
day14
Viable cell density
(x 10⁴ cells/mL)
1400
1200
1000
800
600
400
200
0
0.6k x A7-
0.6k x A7+
1.1k x A7-
1.1k x A7+
Pool1
Pool2

Figure 11B

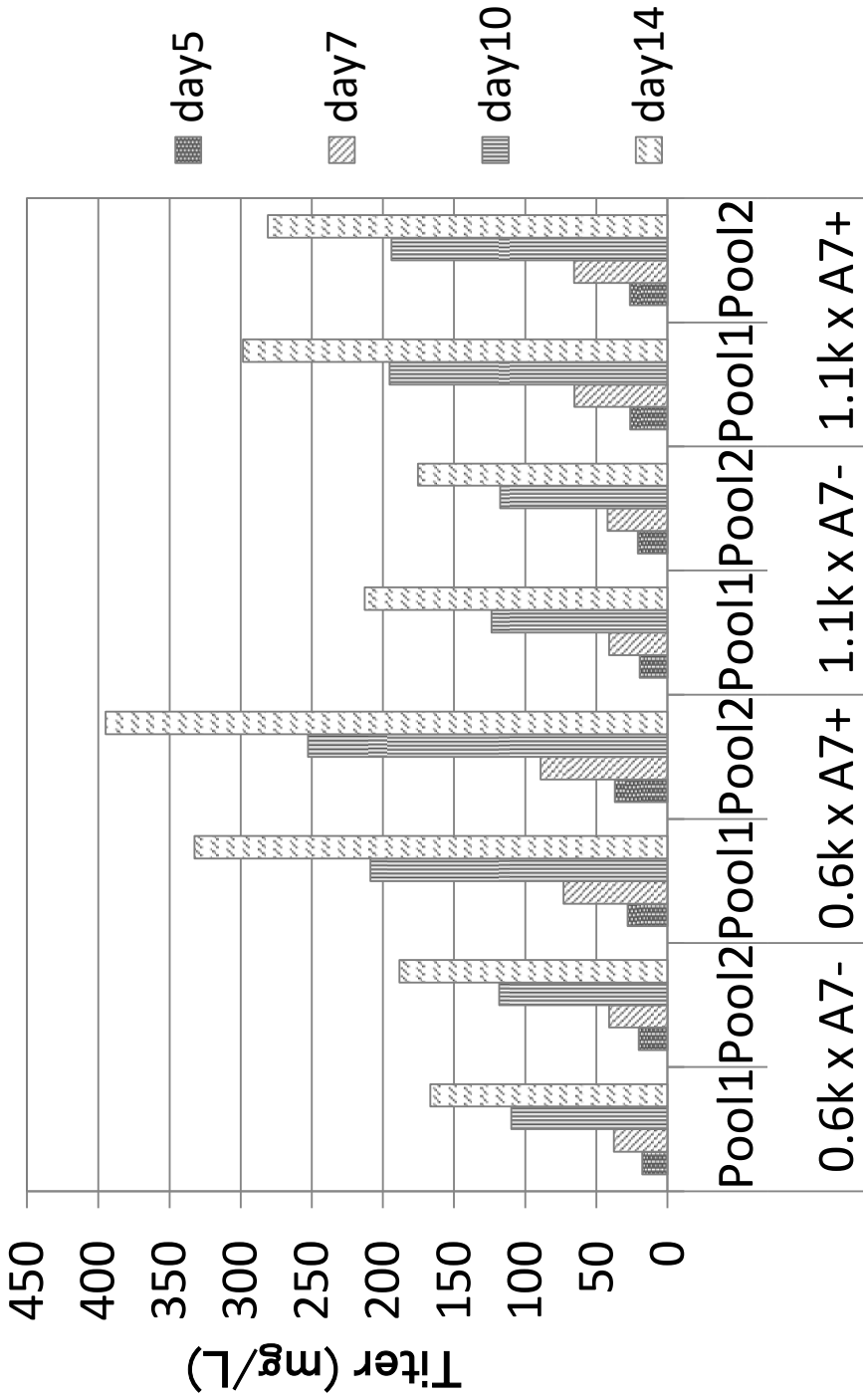
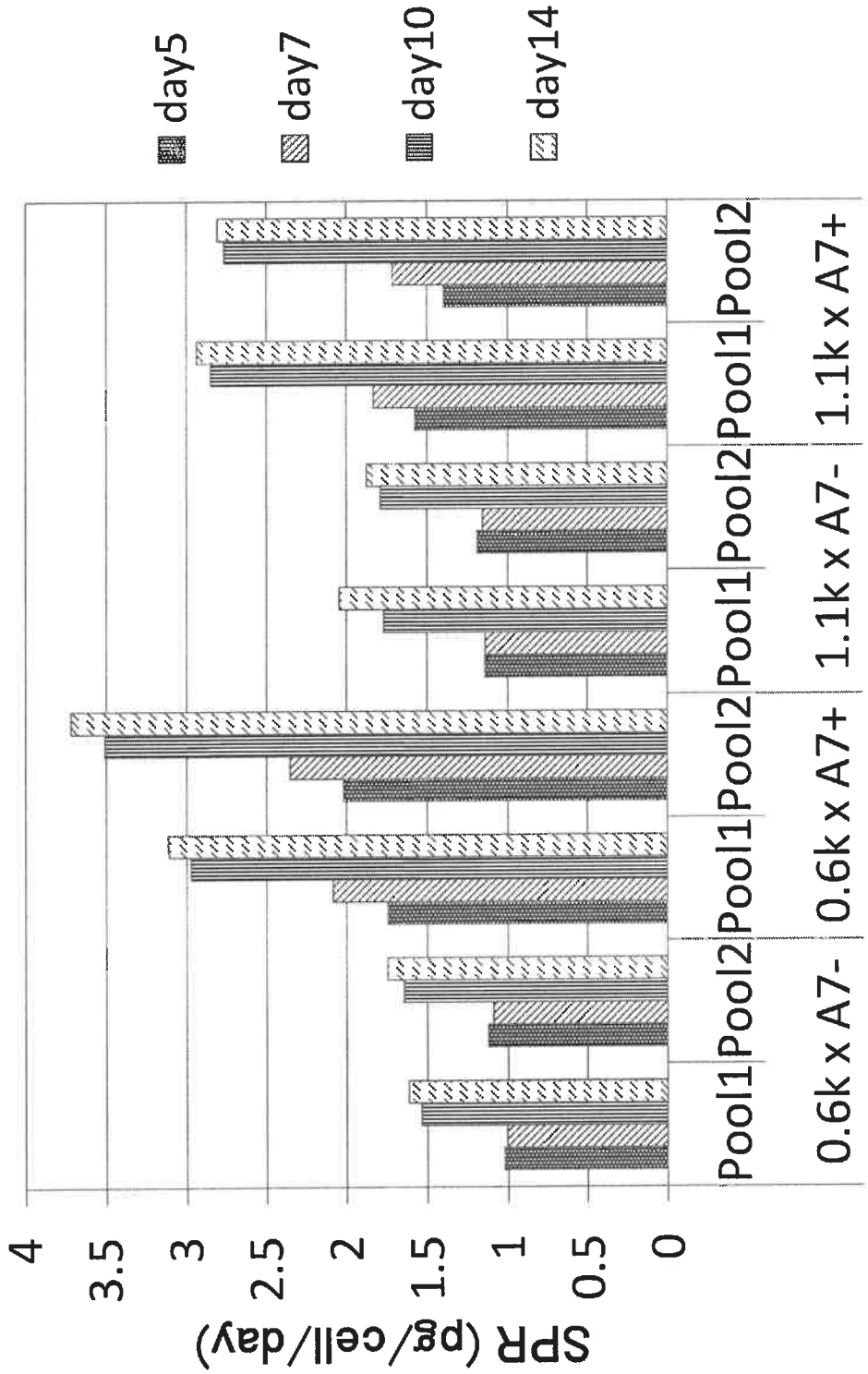

day5
day7
day10
day14
Titer (mg/L)
450
400
350
300
250
200
150
100
50
0
0.6k x A7-
Pool1Pool2
0.6k x A7+
Pool1Pool2
1.1k x A7-
Pool1Pool2
1.1k x A7+
Pool1Pool2

Figure 11C


day5
day7
day10
day14
SPR (pg/cell/day)
4
3.5
3
2.5
2
1.5
1
0.5
0
0.6k x A7-
Pool1
Pool2
0.6k x A7+
Pool1
Pool2
1.1k x A7-
Pool1
Pool2
1.1k x A7+
Pool1
Pool2

[Figure 12A]

SEQ ID NO: 1: Nucleotide sequence of polynucleotide which is Chinese hamster-derived Hspa5 promoter

TATAGCCCAGGCACACATGAACTTGTAATCCTCCTGCTTCAGCCTCTTCAGTAGCTGGGG
TTACAGGCCTACCACTAGGTGTGGCTCAGGTATCACTTTTTTAAATGTTACAAAAATTGG
TGCAAGTACTTCATTAATCAAAAAACAGGCTGAAATTGAGTTTTGTATTTTAGTGGAAAT
AGACTGTGATACAGATGTGCTTGAAATGACATGAAGCTGTGATGTGGTCAAATAGTGATT
TTTTTCTTTCATTTCTTCTTCTTGTTCTTACTCTTTTTTCATATAGGGTTTCAATATGCA
GCTCTGGAACTATTTAGACCAGGATGGCCTTGAATTCAAGAGATCCCTCTGCTTCTGCCT
CCCTTGTGCTGAGATTAAAGTCATGAGCCACCATATCCGGCTGTAGTCTCCTTTAAAATT
CAAGCCAAAAGTATCTGCAAAGATGGTCGGTGGTTAAGAGCACTGGCTGCTCTTTCATGG
GACCAGGGATTAAAGGCATGCAGCAGTAAACTGGGCTTAGTGACTTCTGTCTTCATACTG
GACTGGTACAGTCCCAAGGAAGATCAATGTTATGACAGTATTACAAGCCTTACTGAAAGT
GGTGTATGATGCAACATCTGTAGAAAAGATGGTGTTGACTGAGTCACCAACATAACCTTT
GAGGAACAAGAAAGGAGAAATTCCTGAACAGTGACTCACAAGCTCACATTTTAGTGAACT
GTGTGTAATGTTCCAGTAGTATTCAGACAGTCTACTTATGAAGCTCAAGATACATTTAAT
GGGAATACTGGAGTCATTTCCTGCCCGTGACAACATCCTAAGCATCTCCTATAAGCATGT
ATATAAGTAAGCACATGGGAGGCAGAGACAGTAGATCTGAGAGCTCCATCCCAGGGGATG
GATATCAGTCAGTTGCCTAGCATGCACAGAATCTTGGGTCAAGTCCCAACTGGACACAGT
AATGTATGCCTATTAGTCCCAACACTTGGAAGGTATTGGCAGAAGGTTCAGGAGTTCAAA
GTCATCTGCTACAAAGTGTTGAGGCTAGCCTGGGTTACATGAGTCTCCATCTTTAAAAAA
AGAAAAAAGTGGGGCTGGAAAGATGGCTCAGTGGTTAAGAGCACCGCCTGCTCTTCCAAA
GGTCCTGAGTTCAATTCCCAGCAACCACATGGTGGCTCAAAACCATCTGTAGTGAAATCT
GGTGCCCTCTGTGTACAAGATAAATGAATGAATCTTAAAAAAAAAAGTCAGTGGGTGGTG
GTGGCGCACACCTTTAGTCCCAGCACTCGGGAGAGGCAGGTGTGAGTTCGAGACCAGCCT
GGTCTACAAGAGCTACTTCCAGGACAAAGCCTCCAAAGCCACAGAGAAACCCTGTCTCGA
AAAACCAAACCAAACCAAACCAAAAAAGTCAATAGCATAAGCTACAGATCAACCAGGTTA
TCAATTCTACCTGTACCACTCACCAGTGACTATTCTATTTAGCCACCCCCCCCCCAATGA
TCTCTTCTGGAAAATGGGAAACATCTACCAAGAATTAATCAAAGGACTAAATGACACATG
CAAAAAAAAAAAAACCTTAGAACAGTGTTTTAAGCAGGATAAGTAGTTCAAGACCAGTTT
GGACCATGTCTCAAAACTAAAGGAACAACGAAGTACATTTAGTATTTTTTGCAACATGTT
ATTATTACATAGCATCAGGAAGACAATTTTTTCTTTGTCTGCTAAATGCCTTTGTCATAT
CAGACCTATTTCAAGAGTCAGGATAGAATGGTGTCAAGAAGGGATGAGGAAGGACTTGTA
AATTATAACCAAGCCACAAATGAAAATGATAGACAAGGATCGGGAACATTATGGGGCGAC
AAGCTAGAGAAAAAAAATGATATATTCCAGGGTGGAAAGTGCTCGCTTGACTATTCATAG

[Figure 12B]

AACAGAATAGCCACAGCATAGCGGGGGGCTCAGTACTAGGTTGCAAATGGCCAGGCCAAT
TCTGGGACTTAACCCCAAGAAAAGAAAAATTGGCAAGGCCAGGATAGACAAATGCAGCTG
GCCTAGGGGTGAAGGGAAAACAGTTGGCTGAGAAGAGCCACGATTCGCAGAGAGGCAGAA
CACAGACTAGGACCCAGCTCGAGACGTGCAGGCCGGGTGGGTAACATAGAGCCCGGGCGC
TCGGCTACCCGAGAACGTGAGGGAGGCTTGGAAGGGCAGAGATGCGTTCCCAGGCGACCA
CAGCATCTATGCTGAGGCTGAGCAGCTCGGGACCCGAGGGGACTTAGGAGGAGAAAAGGC
CGCATACTGCTTCGGGGTAAGGGACAGACCGGGGAAGGACCCAAGTCCCACCGCCCAGAG
GGAACTGACACGCAGACCCCGCAGCAGTCCCCGGGGGCCGGGTGACGGGAGGACCTGGAC
GGTTACCGGCGGAAACGGTCTCGGGTTGAGAGGTCACCTGAGGGACAGGCAGCTGCTGAA
CCAATAGGACCGGCGCACAGGGCGGATGCTGCCTCTCATTGGCGGCCGTTGAGAGTAACC
AGTAGCCAATGAGTCAGCCCGGGGGGCGTAGCGGTGACGTAAGTTGCGGAGGAGGCCGCT
TCGAATCGGCAGCGGCCAGCTTGGTGGCATGGACCAATCAGCGTCCTCCAACGAGAAGCG
CCTTCACCAATCGGAGGCCTCCACGACGGGGCTGGGGGGAGGGTATATAAGCCAAGTCGG
CGGCGGCGCGCTCCACACTGGCCAAGACAACAGTGACCGGAGGACCTGCCTTTGCGGCTC
CGAGAGGTAAGCGCCGCGGCCTGCTCTTGCCAGACCTCCTTTGAGCCTGTCTCGTGGCTC
CTCCTGACCCGGGGGGCTTCTGTCGCCCTCAGATCGGAACGCCGCCGCGCTCCGGGACTA
CAGCCTGTTGCTGGACTTCGAGACTGCAGACGGACCGACCGCTGAGCACTGGCCCACAGC
GCCGGCAAG

[Figure 13]

SEQ ID NO: 2: Nucleotide sequence of polynucleotide which is human-derived Hspa5 promoter

ACAGTAGGGAGGGGACTCAGAGCTGGAGGCAATTCCTTTGGCCGGGCTTGTCCTGCGACTTACC
GTGGGGCAGCGCAATGTGGAGAGGCCTGGTAAAATGGCTGGGCAAGGGTGCGGAGGGGACATAA
CTGGCAGGAAGGAGTCATGATTCGTGGTCGAACAGAGTCCAGACCAGCTCGACCTGTGAGCAAC
GAACGGCCCTGAGACTCGCATACCCCAATACCGGTAGTGGCCGTGAAGGGCAAAGAAATGTGTT
CTGAGGCGATCCCAGCATCTAAGCTGCGACTGGTCTACTCAGAGACTGGATGGAAGCTGGGAAG
AGAAAGCTGCTTCCCGCTTCGGGGTGAGGGATGGAGGAAGGGAGAACAAGCAGTAGAGAAGGAA
AAGTTTCAGATCCCACAGCCCCGGGGGGTCACTCCTGCTGGATCTACTCCGACCCCCTAGGGCC
GGGAGTGAAGGCGGGACTTGTGCGGTTACCAGCGGAAATGCCTCGGGGTCAGAAGTCGCAGGAG
AGATAGACAGCTGCTGAACCAATGGGACCAGCGGATGGGGCGGATGTTATCTACCATTGGTGAA
CGTTAGAAACGAATAGCAGCCAATGAATCAGCTGGGGGGGCGGAGCAGTGACGTTTATTGCGGA
GGGGGCCGCTTCGAATCGGCGGCGGCCAGCTTGGTGGCCTGGGCCAATGAACGGCCTCCAACGA
GCAGGGCCTTCACCAATCGGCGGCCTCCACGACGGGGCTGGGGGAGGGTATATAAGCCGAGTAG
GCGACGGTGAGGTCGACGCCGGCCAAGACAGCACAGACAGATTGACCTATTGGGGTGTTTCGCG
AGTGTGAGAGGGAAGCGCCGCGGCCTGTATTTCTAGACCTGCCCTTCGCCTGGTTCGTGGCGCC
TTGTGACCCCGGGCCCCTGCCGCCTGCAAGTCGGAAATTGCGCTGTGCTCCTGTGCTACGGCCT
GTGGCTGGACTGCCTGCTGCTGCCCAACTGGCTGGCAAG

[Figure 14]

SEQ ID NO: 3: Nucleotide sequence of polynucleotide which is mouse-derived Hspa5 promoter

ATGGTGGAAAGTGCTCGTTTGACCATAGTACTGAATCTCCGCGGCGGAGAAAGGGAATAGGTTA
CAATTGGCCAGGCCAATCCTGGGACTTAACCCCGGCAAAGGGAAGATTCGAAAGGCCTGGAAAG
ACACATACGGCTAGCCTTGGGGTGAAGGAGAAACACGGTTAGCTGAGAAGCACCAGGATTCTCA
GCGAGGCAGAATCCAGATCAGGCCCCAGCTCGAGACGTGCAGGCCGGGCGAGTAACAGGGCCTG
GACTCTGGGACATCCGAGAACGTGTGGAGGCTGGGGAGGGCGATCACAGCTGAGGCCGGGCAGC
TCAGGACGCGGGGAATCGAGGAGGAGAAAGGCCGCGTACTTCTTCAGAGTGAGAGACAGAAAAG
GAGACCCCGAGGGAACTGACACGCAGACCCCACTCCAGTCCCCGGGGGCCTGGCGTGAGGGGAG
GACCTGAACGGTTACCGGCGGAAACGGTCTCGGGGTGAGAGGTCACCCGAAGGACAGGCAGCTG
CTGAACCAATAGGACCAGCGCTCAGGGCGGATGCTGCCTCTCATTGGTGGCCGTTAAGAATGAC
CAGTAGCCAATGAGTCAGCCCGGGGGGCGTAGCAATGACGTGAGTTGCGGAGGAGGCCGCTTCG
AATCGGCAGCAGCCAGCTTGGTGGCATGGACCAATCAGCGGCCTCCAACGAGTAGCGACTTCAC
CAATCGGAGGCCTCCACGACGGGGCTGTGGGGAGGGTATATAAGGCGAGTCGGCGACGGCGCGC
TCGATACTGGCCGAGACAACACTGACCTGGACACTTGGGCTTCTGCGTGTGTGTGAGGTAAGCG
CCGCGGCCTGCTGCTAGGCCTGCTCCGAGTCTGCTTCGTGTCTCCTCCTGACCCCGAGGCCCCT
GTCGCCCTCAGACCAGAACCGTCGTCGCGTTTCGGGGCCACAGCCTGTTGCTGGACTCCTAAGA
CTCCTGCCTGACTGCTGAGCGACTGGTCCTCAGCGCCGGC

[Figure 15]

SEQ ID NO: 4: Nucleotide sequence of polynucleotide which is rat-derived Hspa5 promoter

CTCAACGGAGAAGGGCTCCGGACTAGGTTACAATTGGCCAGGCCAATCCTGGGACTTATCCCCG
GGAAAGGGAAAATCAGAAAGGCCCAGAAACATACATACAACTAGACTTGGGGTGAACGAGGAGC
ATGATTAGCTGAGAAGAGCCAGGATTCTCAGCGAGGCAGAACCCATACCAGGCCCCAGCCCGGG
ACATGCAGGCCCGTTGAGTAACAGGGCCTGGACGCTGGAACACCCGAGAAAAGTGCCGAGGCTG
GGAAGGGTGATCACAGCATCACAGCTGAGGCCGGGCAGCTGAAGACATGAGTGAATCTAGGAGA
AGAAAGGCAGCGTACTTCTTCCGAGTGAGAGACAGAAAGAGAGGACCCGAGTCTCACAGCCCTG
AGGGAACTGACACGCAGACCCCACTCCAGTCCCCGGGGGCCCAACGTGAGGGGAGGACCTGGAC
GGTTACCGGCGGAAACGGTTTCCAGGTGAGAGGTCACCCGAGGGACAGGCAGCTGCTCAACCAA
TAGGACCAGCTCTCAGGGCGGATGCTGCCTCTCATTGGCGGCCGTTAAGAATGACCAGTAGCCA
ATGAGTCGGCCTGGGGGGCGTACCAGTGACGTGAGTTGCGGAGGAGGCCGCTTCGAATCGGCAG
CGGCCAGCTTGGTGGCATGAACCAACCAGCGGCCTCCAACGAGTAGCGAGTTCACCAATCGGAG
GCCTCCACGACGGGGCTGCGGGGAGGATATATAAGCCGAGTCGGCGACCGGCGCGCTCGATACT
GGCTGTGACTACACTGACTTGGACACTTGGCCTTTTGCGGGTTTGAGAGGTAAGCGTCGCGGCC
TGCTTCCAGGCCTACCCTGATTTTGGTTCGTGGCTCCTCCTGACCCTGAGACCTCTGTCGCCCT
CAGATCAGAACCGTCGTCGCGTTTCGGGGCTACAGCCTGTTGCTGGACTCTGTGAGACACCTGA
CCGACCGCTGAGCGACTGACTGGTCCACAGCGCCGGCAAG