Supplementary information

The synthesized *Nhe*I-intron-opvhb-*Sma*I sequence

GCTAGCATGCCCGTGAGTCCTGCATCCCCATCGTGCACCGTATTCACCTCAT
CGTTTGGCCCCCTTCTCACAGGTCAAGGTCATGCTCGACCAGCAGACCATC
AACATCATCAAGGCCACCGTCCCCGTCCTCAAGGAGCACGGCGTCACCATC
ACCACCACCTTCTACAAGAACCTCTTCGCCAAGCACCCCGAGGTCCGCCCC
CTCTTCGACATGGGCCGCCAGGAGTCCCTCGAGCAGCCCAAGGCCCTCGC
CATGACGGTCCTCGCGGCCGCCCAGAACATCGAGAACCTCCCCGCCATCCT
CCCCGCCGTCAAGAAGATCGCCGTCAAGCACTGCCAGGCCGGCGTCGCCG
CCGCCCACTACCCCATCGTCGGCCAGGAGCTCCTCGGCGCCATCAAGGAG
GTCCTCGGCGACGCCGCCACCGACGACATCCTCGACGCCTGGGGCAAGGC
CTACGGCGTCATCGCCGACGTCTTTATCCAGGTCGAGGCCGACCTCTACGC
CCAGGCCGTCGAGTGACCCGGG

The *gpd* intron sequence was highlighted in red-color font

Sequence alignment of the original and optimized VHb gene.