**Additional file 1.** Primer sets used for PCR

| Locus | Forward | Reverse | Objectives |
|---|---|---|---|
| FeDFR1a | FeDFRdeg1F,<br>5′-GTNTTYCAYGTNGCNACNCCNATG-3′ | FeDFRdeg1R,<br>5′-ACRAARTACATCCATCCNGTCATYTT-3 | Isolation |
| | FeDFR1aRTF,<br>5′-CATCGAAGAAGCTGACCGACGAA-3′ | FeDFR1aRTR,<br>5′-CCTTCAACACCTTCCATTCTCAC-3′ | RT-PCR |
| | FeDFR1aLinkF,<br>5′-CAAGATGACTGGATGGGTAACTC-3′ | FeDFR1aLinkR,<br>5′-CGAAGTACATCTGCATTTATAC-3′ | Linkage Analysis |
| | FeDFR1aCloF,<br>5′-TCGAATTCGATGGTTGCTGAGGGAGAGATCGTC-3′ | FeDFR1aCloR,<br>5′-GGCGGCCGCTCAATGGCCATTACCATTTACA-3′ | Cloning for the production of recombinant protein |
| FeDFR2 | FeDFRdeg2F,<br>5′-CGWGCMCYGTBCGWGA-3′ | FeDFRdeg2R,<br>5′-CATRGGNGTKGCSACRT-3′ | Isolation |
| | FeDFR2RTF,<br>5′-TCGTCTGCCGGGACTGTTGTT-3′ | FeDFR2RTR,<br>5′-CGTATGCCGGAACTCGGACCCCATA-3′ | RT-PCR |
| | FeDFR2LinkF,<br>5′-GGCAAATTTGACACTGTGGAAGG-3′ | FeDFR2LinkR,<br>5′-AATGAAGGGTCCTACGACCAATG-3′ | Linkage Analysis |
| | FeDFR2CloF,<br>5′-AAGGATCCCATGGGTTTTGAAGGTGAAGTTGTG-3′ | FeDFR2CloR,<br>5′-GGCGGCCGCTTAATCTTAAACAGATACATTGTCG-3′ | Cloning for the production of recombinant proteins |

The degenerate primers for FeDFR2 were used based on the procedure of Deng and Davis [18].

Degenerate PCR for FeDFR1a and FeDFR2 were performed using genome DNA and cDNA, respectively.