**Table S1**. Primers used in this study\*

|  |  |  |
| --- | --- | --- |
| For function | Primer name | Sequence |
| Gene knockout |  |  |
| FRT-zeo-FRT casette | FC294\_zeoR\_F | *gaagttcctattctctagaaagtataggaacttc*CTCTGAAATGAGCTGTTGACAATTAATCAT |
|  | FC295\_zeoR\_R | *gaagttcctatactttctagagaataggaacttc*CGTTCATGTCTCCTTTTTTATTCAGTCCTG |
| Δ*mxaY* | FC541\_mxaYLF\_F | TTTGTGATGGATTTCCGGTGTGTG |
|  | FC542\_mxaYLF\_R | tcagag*gaagttcctatactttctagagaataggaacttc*GATCGAACCGCCTAGTAACAATATACA |
|  | FC543\_mxaYRF\_F | tgaacg*gaagttcctattctctagaaagtataggaacttc*ATGGCAGTTAGCGCAACGATAC |
|  | FC544\_mxaYRF\_R | CTCGGTGGAAACGAAGAAATTCGA |
| ΔMETBUDRAFT\_1817 | FC553\_1817LF\_F | TTGGCGGTGCATCAAACCTTAC |
|  | FC554\_1817LF\_R | tcagag*gaagttcctatactttctagagaataggaacttc*GTATCATGCGTTCCGAGCAACA |
|  | FC555\_1817RF\_F | tgaacg*gaagttcctattctctagaaagtataggaacttc*ACGGCACGCAAATAAGAAATAAGC |
|  | FC556\_1817LF\_R | GCTCGGCAGTCGTTATACCTTT |
| pFC44 |  |  |
| PmxaY and *mxaY* | FC545\_PmxaY\_F | ttcatggttaaactgccgaattTTCGACCGAATCGACATATCTCC |
|  | FC546\_PmxaYORF\_R | tagccatgtttcctcaatggTCATAAAATAGGTATCGTTGCGCTAACT |
| pFC45 |  |  |
| For *mxaY* E147G | FC549\_mxaYA440G\_F | ATGGATGAAACCGTCGGGGTTTGGCACGAAAC |
|  | FC550\_mxaYA440G\_R | GTTTCGTGCCAAACCCCGACGGTTTCATCCAT |
| For qRT-PCR |  |  |
| *xoxF* | FC401\_276xoxF\_F | ATTCACACTCCATTCCCTAACACC |
|  | FC402\_550xoxF\_R | CTAATGGAGCTTGAGTGTTGGTCATG |
| *mxaF* | FC403\_169mxaF\_F | AGTTGTACGACATCAACATCACG |
|  | FC404\_367mxaF\_R | GCTTCGGTTTGAATTGCCACA |
| 16S | FC409\_34816S3\_F | ATATTGGACAATGGGCGCAAG |
|  | FC410\_62316S3\_R | CAAATGCCGTTCCCAGGTTAAG |
| *mxaB* | FC413\_mxaF\_LF\_F | AGTTGTTGCGCTAATTCGGGTTC |
|  | FC464\_mxaB\_R | CAACCGAATATCGTCGTGATGGAC |

\*Primer regions used for Gibson or PCR stitching junctions are in lower case, FRT sites are italicized, and *mxaY* site-directed mutation is underlined.