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Supplementary Material

Applied Microbiology and Biotechnology

3C protease-independent production of foot-and-mouth disease

virus-like particles in *Pichia pastoris*

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18 Optimized VP0 gene sequence: 909 bp

19 GGC GCCCGT CAGTC GAGCCCCG TACCGGCT CTCAGA ACCAGAG CGGGAACACT GGGT C
20 CATTATAAATACTACTATATGCAACAATACCAAAATTCTATGGATACTCAGTTAGGTGACAA
21 CGCGATCTCGGGAGGTAGCAATGAGGGTTCTACAGACACAACGTCCACACATACTACAAA
22 CACTCAGAATAATGACTGGTTTTTCGAAGCTTGCTTCTAGTGCATTTTCGGGTCTCTTTGGAG
23 CGCTCCTGGCAGATAAGAAGACGGAAGAAACCACTTTGCTGGAAGACCGCATCCTCACCA
24 CGCGGAATGGCCATACGACGAGTACGACTCAATCAAGTGTTGGTATCACACATGGATATGC
25 TACAGCCGAGGATTTTGTTAATGGGCCCAATACCTCTGGGCTAGAACTAGAGTCATTCAA
26 GCGGAAAGATTCTTCAAACTCACCTATTTCGATTGGGTAAACGAGTGATCCTTTTGGACGTT
27 ATTATTTGTTGGAAC TTCCAACAGATCACAAGGGCGTGTATGGGTCATTAACAGACTCCTAT
28 GCGTACATGAGGAATGGCTGGGATGTTGAAGTTACCGCCGTGGGAAACCAATTCAACGGT
29 GGGTGCCTCCTAGTAGCTATGGTTCCCGAGCTATGTAGCATTGAGCAGCGTGAGTTATTCCA
30 GCTGACCTGTTTTCCCCACCAGTTCATAAACCCGAGGACGAACATGACCGCACATATAAAG
31 GTGCCGTTTGTCTGGAGTAAACCGATACGACCAATACAAAGTACATAAACCTTGGACACTTG
32 TTGTTATGGTAGTCGCTCCACTTACGGTAAACACCGAGGGCGCCCCCTCAAATTAAAGTCTA
33 CGCAAATATAGCTCCAACCAATGTGCACGTGGCGGGGGAGTTCCCGTCAAAAGAA

34

35 Optimized VP3 gene sequence: 660 bp

36 GGAATCTTTCCGGTGGCGTGTTTCGGATGGTTATGGGGGTTTAGTCACTACAGACCCCAAGA
37 CTGCCGATCCTGTATACGGTAAGGTCTTTAACCCCTCCGCGTAATATGCTTCCGGGACGCTTC
38 ACAAATTTACTCGATGTTGCTGAAGCTTGCCCCACGTTCTTGCAATTCGATGGCGACGTTCC
39 ATACGTAACCACTAAAACAGATTCGGATCGGGTGCTAGCGCAGTTCGACCTTTCACTCGCT
40 GCTAAGCACATGTCTAACACCTTTCTAGCGGGCCTAGCCCAATATTATACACAATACAGCGG
41 GACGGTGAATCTGCACTTTATGTTCACTGGTCCCACGGACGCCAAGGCGAGGTACATGATT
42 GCATATGCACCTCCAGGCATGGAGCCGCCTAAGACCCCAGAGGCAGCAGCACATTGCATA
43 CACGCCGAATGGGACACAGGCTTGAACAGCAAATTTACCTTTAGTATAACCATACCTTTTACG
44 CCGCTGACTACGCCTATACGGCATCCGACGCTGCGGAAACGACTAACGTGCAGGGGTGGG
45 TTTGTTTATTTCAAATCACTCATGGTAAAGCAGAAGGGGATGCGTTGGTAGTTCTGGCTTCT
46 GCCGAAAAGATTTTCGAGCTCCGACTGCCCCGTGCACGCGAGACAGCAG

47

48 Optimized VP1 gene sequence: 633 bp

49 ACGACCAGCACTGGGGAGTCAGCAGATCCTGTGACGACCACGGTGGAGAATTATGGAGG
50 CGAAACACAGGTACAGCGTAGGCATCACACGGATGTGTCATTTATTCTGGACAGATTCGTC
51 AAAGTGACTCCCAAAGACTCCATTAATGTGCTAGACCTCATGCAAACCCCATCGCACACGT
52 TGGTCGGGGCACTACTCCGAAC TGCGACATACTACTTTGCGGACTTGGAAGTCGCTGTCA
53 AACACAAAGGTGATCTTACGTGGGTTCCCTAATGGAGCTCCTGTAGCTGCGCTCGACAACA
54 CCACTAACCCCACTGCCTACCATAAGGCTCCGTTGACCCGGCTTGCACTGCCCTATACAGC
55 CCCTCACCGAGTTCTGGCCACCGTATACAACGGTGAATGCAAGTACGCAGAAGGTAGTCTT
56 CCGAATGTTTCGTGGCGATTTACAGGTTTTAGCGCAAAGGCGGCCCGGCCCTTGCCAACTT
57 CTTTCAACTATGGCGCTATCAAGGCAACACGTGTAATCGAGCTTCTGTATAGGATGAAAAG
58 AGCCGAGACATATTGTCCGCGCCCACTATTAGCTGTTTCATCCGTCCGCAGCGCGCCATAAG

59 CAGAAAATAGTCGCCCCTGTAAAGCAA

60

61 Optimized VP1-GHH (His₆ at position 136) gene sequence: 711 bp

62 ACGACCAGCACTGGGGAGTCAGCAGATCCTGTGACGACCACGGTGGAGAATTATGGAGG
63 CGAAACACAGGTACAGCGTAGGCATCACACGGATGTGTCATTTATTCTGGACAGATTCGTC
64 AAAGTGACTCCCAAAGACTCCATTAATGTGCTAGACCTCATGCAAACCCCATCGCACACGT
65 TGGTCGGGGCACTACTCCGAAGTGCACATACTACTTTGCGGACTTGGAAGTCGCTGTCA
66 AACACAAAGGTGATCTTACGTGGGTTCTAATGGAGCTCCTGTAGCTGCGCTCGACAACA
67 CCACTAACCCCACTGCCTACCATAAGGCTCCGTTGACCCGGCTTGCACTGCCCTATACAGC
68 CCCTCACCGAGTTCTGGCCACCGTATACAACGGTGAATGCAAGTACGGGGGCGGAGGTTT
69 CGGAGGGGGAGGTTCTCATCACCATCACCACCATGGGGGCGGGGGCTCGGGCGGAGGTG
70 GTAGTGCAGAAGGTAGTCTTCCGAATGTTTCGTGGCGATTTACAGGTTTTAGCGCAAAAGGC
71 GGCCCGGCCCTTGCCAACTTCTTTCAACTATGGCGCTATCAAGGCAACACGTGTAATCGAG
72 CTTCTGTATAGGATGAAAAGAGCCGAGACATATTGTCCGCGCCCACTATTAGCTGTTTCATCC
73 GTCCGCAGCGCGCCATAAGCAGAAAATAGTCGCCCCTGTAAAGCAA

74

75 Optimized VP3-CH (His₆ at C terminus) gene sequence: 708 bp

76 GGAATCTTTCCGGTGGCGTGTTTCGGATGGTTATGGGGGTTTAGTCACTACAGACCCCAAGA
77 CTGCCGATCCTGTATACGGTAAGGTCTTTAACCCCTCCGCGTAATATGCTTCCGGGACGCTTC
78 ACAAATTTACTCGATGTTGCTGAAGCTTGCCCCACGTTCTTGCAATTCGATGGCGACGTTCC
79 ATACGTAAACCACTAAAACAGATTCGGATCGGGTGCTAGCGCAGTTCGACCTTTCACTCGCT
80 GCTAAGCACATGTCTAACACCTTTCTAGCGGGCCTAGCCCAATATTATACACAATACAGCGG
81 GACGGTGAATCTGCACTTTATGTTCACTGGTCCCACGGACGCCAAGGCGAGGTACATGATT
82 GCATATGCACCTCCAGGCATGGAGCCGCCTAAGACCCAGAGGCAGCAGCACATTGCATA
83 CACGCCGAATGGGACACAGGCTTGAACAGCAAATTTACCTTTAGTATACCATACCTTTCAG
84 CCGCTGACTACGCCTATACGGCATCCGACGCTGCGGAAACGACTAACGTGCAGGGGGTGGG
85 TTTGTTTATTTCAAATCACTCATGGTAAAGCAGAAGGGGATGCGTTGGTAGTTCTGGCTTCT
86 GCCGAAAAGATTCGAGCTCCGACTGCCCCTGACGCGAGACAGCAGGGGGGGGGCGG
87 ATCTGGTGGAGGCGGTTTCGCACCACCATCATCATCAC

88

89 Optimized VP1-CH (His₆ at C terminus) gene sequence: 682 bp

90 ACGACCAGCACTGGGGAGTCAGCAGATCCTGTGACGACCACGGTGGAGAATTATGGAGG
91 CGAAACACAGGTACAGCGTAGGCATCACACGGATGTGTCATTTATTCTGGACAGATTCGTC
92 AAAGTGACTCCCAAAGACTCCATTAATGTGCTAGACCTCATGCAAACCCCATCGCACACGT
93 TGGTCGGGGCACTACTCCGAAGTGCACATACTACTTTGCGGACTTGGAAGTCGCTGTCA
94 AACACAAAGGTGATCTTACGTGGGTTCTAATGGAGCTCCTGTAGCTGCGCTCGACAACA
95 CCACTAACCCCACTGCCTACCATAAGGCTCCGTTGACCCGGCTTGCACTGCCCTATACAGC
96 CCCTCACCGAGTTCTGGCCACCGTATACAACGGTGAATGCAAGTACGCAGAAGGTAGTCTT
97 CCGAATGTTTCGTGGCGATTTACAGGTTTTAGCGCAAAAGGCGGCCCGGCCCTTGCCAACTT
98 CTTTCAACTATGGCGCTATCAAGGCAACACGTGTAATCGAGCTTCTGTATAGGATGAAAAG
99 AGCCGAGACATATTGTCCGCGCCCACTATTAGCTGTTTCATCCGTCCGCAGCGCGCCATAAG

100 CAGAAAATAGTCGCCCCTGTTAAGCAAGGGGGGGGCGGATCTGGTGGAGGCGGTTCGCAC
101 CACCATCATCATCACt