1. Introduction

This document supplements the paper, '**Improving the gene-structure annotation of the Apicomplexan parasite *Neospora caninum* fulfils a vital requirement towards an *in silico* derived vaccine'**. It contains the mRNA sequence followed by the exon structure for 360 annotated genes that were found in the study to have alternative compliant start codons. If the gene has a Suboptimal ATG context e.g. [CT]..ATG[ACT], the mRNA sequence followed by the exon structure for the next ATG downstream is also provided (denoted by the word 'Leaky' on the gene header).

Note that in the exon structure the 5' and 3' UTRs are shown in addition to the old start and end annotation

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1813677,1813692,16,5' UTR
1813693,1814026,334,GT,END:Starts:1813662-1813637-1813677-,Old start=1813969
1814583,1814845,263,INTERNAL,EXACT,AG-GT
1815535,1815823,289,INTERNAL,EXACT,AG-GT
1816213,1816313,101,INTERNAL,EXACT,ATG:AG-GT
1816671,1816817,147,AG,START:Ends:1818761-1818800-1818799-,Old end=1816817
1816818,1818800,1983,3' UTR

>Leaky:NCLIV_011740 TGCAATGT

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1814583,1814845,263,INTERNAL,EXACT,AG-GT
1815535,1815823,289,INTERNAL,EXACT,AG-GT
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ID=NCLIV_012070 + 3 TTTTCCGCGATGATTCCTTC IV [CT]..ATG[ACT]
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2107620,2108487,868,GT,END:Starts:2107254-2107260-2107324-,Old start=2107875
2108895,2109283,389,INTERNAL,END: start -147 AG-GT (ref:AG-GT)<< Possible error
2110297,2110323,27,AG,OVER:Ends:2111783-2111757-2112584-,Old end=2110323
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>Leaky:NCLIV_012070 CGCCATGT
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Leaky:ID=NCLIV_012070 + 3 TTTTCCGCGATGATTCCTTC IV CGCCATGT
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2107641,2108487,847,GT,END:Starts:2107254-2107260-2107324-,Old start=2107875
2108895,2109283,389,INTERNAL,END: start -147 AG-GT (ref:AG-GT)<< Possible error
2110297,2110323,27,AG,OVER:Ends:2111783-2111757-2112584-,Old end=2110323
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1007350,1008025,676,INTERNAL,START: end 1089 GT
1008497,1012773,4277,INTERNAL,END: start 857 AG-GT (ref:AG-GT)<< Possible error
1013079,1013248,170,INTERNAL,END: start 57 AG-GT (ref:AG-GT)<< Possible error

1013714,1013747,34,AG,,Old end=1013747 (-1000)
1013748,1014747,1000,3' UTR

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1139409,1139669,261,INTERNAL,OVER: start -3 and end 694 GT
1139952,1140166,215,INTERNAL,OVER: start -2 and end 197 GT
1140258,1140363,106,INTERNAL,END: start -308 GT
1140492,1140726,235,INTERNAL,EXACT,AG-GT
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1139409,1139669,261,INTERNAL,OVER: start -3 and end 694 GT
1139952,1140166,215,INTERNAL,OVER: start -2 and end 197 GT
1140258,1140363,106,INTERNAL,END: start -308 GT
1140492,1140726,235,INTERNAL,EXACT,AG-GT
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3249502,3249623,122,INTERNAL,EXACT,AG-GT
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3251773,3251848,76,INTERNAL,EXACT,AG-GT
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128566,129565,1000,3' UTR
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ID=NCLIV_062330 + 3 GGGGAGGAGATGCACAGGTT XII [CT]..ATG[ACT]
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1639883,1640075,193,INTERNAL,START: end -4 AG-GT (ref:AG-GT)<< Possible error
1640463,1640526,64,AG,START:Ends:1640472-1642413-1643991-,Old end=1640526
1640527,1643991,3465,3' UTR

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Leaky:ID=NCLIV_062330 + 3 GGGGAGGAGATGCACAGGTT XII
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587218,587477,260,INTERNAL,
586849,586957,109,INTERNAL,START: end -6 GT
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1596557,1596997,441,AG,END:Starts:1596257-1596309-,Old start=1596557
1596257,1596558,300,3' UTR

>Leaky:NCLIV_008750 AGGCATGA
ATGAGGGCTACCCTCCACGTCGAAAAAGAGATCTGTCCTGATACGGTGGACGGGGAGAATCTGCA
GCGTCAGATAACTCAACAGGAGGCAGCGCAAACGTTCTGTCTGCCGTTGCAGTCGCTTCGGGACG
CCGTGTCCCAAGGGCTCTTGACGGTGGAAGAACGTCCAAATCCCCATGGCGCGTCGTTTAAGCCGA
TGCGGCTCTATCGCTTTGGAGAGGTCCAGCAGCTCGCGTGGCGTGTGTGGGGTGGCCAAGAGAAG
CTAGAAGAGGAGCGGGAACGGCGGCGAGAGCAGCGCTGGCAGCTTCGCCAGAAACAGGCCCTAG
GCTCTGTGATTGCGCCGCAGGGACCAGGCATTCTTGGCGACTTTGAAACGAAACTGTCCACACAGC
GGGGGTCTGGCGGGCAAGGACGCCCAAAGAAGCGACTTCGGGCGCACGCCAAGTCGCGGCAAGA
AGGGCCAGAACCGCAGCCTGGCCGACGCCGGACCGTTGTAGACAGTCGAGCGTGTCCAGCGATCC
TGGGACAGGCCGAGGCGTCGGCGGCGCAGACTCCCACTCGCCCTTCGGACGACTTGGTCTGGGAA
GTCATATGA

Leaky:ID=NCLIV_008750 - 2 ACAACAGGCATGAGGGCTAC III
AGGCATGA
1597569,1598568,1000,5' UTR
1597416,1597568,153,GT,START:Starts:1597416-,Old end=1597568 (-1000)
1596557,1596997,441,AG,END:Starts:1596257-1596309-,Old start=1596557
1596257,1596558,300,3' UTR
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>NCLIV_009660|[CT]..ATG[ACT]
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CATTCTTCGCCGATCGGCTTCGTGCCATCCGACAGGACGCGGTTCGCCAGCGCCTCAACACAGCGG
ACTTGTTCATTCTCCTCCTTCAGTGTGCTCGGTTCCATCTCTTTGCCGAGTATTTCTGGAGTGGTGG
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TCCAGCTGAAACCTTTGGGAGCAGAGACCACCTTCTCGCCACGAGTAGCGGTGCCCAGGAACAGG
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ID=NCLIV_009660 - 2 GCCGTCGCCATGTCGGGTAG IV [CT]..ATG[ACT]
141511,141526,16,5' UTR
140481,141510,1030,GT,START:Ends:141526-144496-,Old end=142047
139273,140021,749,AG,END:Starts:137988-138544-,Old start=139273
137988,139274,1285,3' UTR

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Leaky:ID=NCLIV_009660 - 2 GCCGTCGCCATGTCGGGTAG IV A..ATG
140494,141526,1033,5' UTR
140481,140493,13,GT,START:Ends:141526-144496-,Old end=142047
139273,140021,749,AG,END:Starts:137988-138544-,Old start=139273
137988,139274,1285,3' UTR
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GCTCCTTTTGCAACGACCTCGAAGGGCGCGTGCAACGAGCGAGACAGCGCACATCTGGTCACCCTT
CTCCATCAGGCCGTGAACGCAGTCGTTCGGTTAGATCTCTACCGCAAGTCGACGATCGCCGTATCT
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CGCAGACAAGTGCACCGTCGTCGACCTCGGATACTGTCCTGCTCAGTCGTCTGCTTGCTTCATCCA
CGCAACGGGGCCTCTCCTTGCCTCCGAGAGCGGCGAGCAGGTGGGCAGTGTTTGCATTTCCCGGCA
ACCGAAACCGCACGAGGCTTAG

ID=NCLIV_010510 - 7 TTCGAAGAAATGCGCACCAT IV A..ATG
757956,758790,835,5' UTR
757778,757955,178,GT,START:EXACT,Old end=757790 (-1000)
757124,757202,79,INTERNAL,EXACT,AG-GT
756513,756618,106,INTERNAL,EXACT,AG-GT
755843,755963,121,INTERNAL,EXACT,AG-GT
755268,755356,89,INTERNAL,EXACT,AG-GT
754535,754603,69,INTERNAL,EXACT,AG-GT
753374,753541,168,AG,END:EXACT,Old start=753374 (+ 1000)
752374,753375,1000,3' UTR
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>NCLIV_011400|[CT]..ATG[ACT]
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ID=NCLIV_011400 - 27 TTTTCCGAGATGAGCAGTCG IV [CT]..ATG[ACT]
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1544145,1544393,249,INTERNAL,EXACT,AG-GT
1543774,1543858,85,INTERNAL,EXACT,AG-GT
1543207,1543334,128,INTERNAL,END: start 15 AG
1542615,1542791,177,INTERNAL,START: end 2 GT
1542037,1542123,87,INTERNAL,EXACT,AG-GT
1541488,1541637,150,INTERNAL,END: start 6 AG
1540884,1541052,169,INTERNAL,START: end -12 GT
1540284,1540390,107,INTERNAL,EXACT,ATG:AG-GT
1539520,1539605,86,INTERNAL,EXACT,AG-GT
1539086,1539234,149,INTERNAL,EXACT,AG-GT
1538407,1538504,98,INTERNAL,EXACT,AG-GT
1537944,1538052,109,INTERNAL,EXACT,AG-GT
1537501,1537601,101,INTERNAL,EXACT,AG
1536940,1537027,88,INTERNAL,
1535936,1536159,224,INTERNAL,EXACT,GT
1535387,1535552,166,INTERNAL,EXACT,AG
1534572,1534679,108,INTERNAL,
1534092,1534187,96,INTERNAL,
1533576,1533776,201,INTERNAL,START: end -7 GT
1533303,1533411,109,INTERNAL,EXACT,AG-GT
1532651,1532790,140,INTERNAL,EXACT,AG

1531968,1532106,139,INTERNAL,EXACT,GT
1531323,1531455,133,INTERNAL,EXACT,AG-GT
1530456,1530655,200,INTERNAL,EXACT,AG-GT
1529898,1529945,48,INTERNAL,EXACT,AG-GT
1529081,1529432,352,AG,END:EXACT,Old start=1529081 (+ 1000)
1528081,1529082,1000,3' UTR

>Leaky:NCLIV_011400 CGAGATGA
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ACACAGAGGAAACCAAAGGGAAGGAGCGAGGCGAGGGAAGAGGTGGACGGACTGGACGGACTA
G

Leaky:ID=NCLIV_011400 - 27 TTTTCCGAGATGAGCAGTCG IV
CGAGATGA
1545125,1546509,1385,5' UTR
1544639,1545124,486,GT,START:Ends:1546720-1546509-,Old end=1545124
1544145,1544393,249,INTERNAL,EXACT,AG-GT
1543774,1543858,85,INTERNAL,EXACT,AG-GT
1543207,1543334,128,INTERNAL,END: start 15 AG
1542615,1542791,177,INTERNAL,START: end 2 GT
1542037,1542123,87,INTERNAL,EXACT,AG-GT
1541488,1541637,150,INTERNAL,END: start 6 AG
1540884,1541052,169,INTERNAL,START: end -12 GT
1540284,1540390,107,INTERNAL,EXACT,ATG:AG-GT
1539520,1539605,86,INTERNAL,EXACT,AG-GT
1539086,1539234,149,INTERNAL,EXACT,AG-GT
1538407,1538504,98,INTERNAL,EXACT,AG-GT
1537944,1538052,109,INTERNAL,EXACT,AG-GT
1537501,1537601,101,INTERNAL,EXACT,AG
1536940,1537027,88,INTERNAL,
1535936,1536159,224,INTERNAL,EXACT,GT
1535387,1535552,166,INTERNAL,EXACT,AG
1534572,1534679,108,INTERNAL,
1534092,1534187,96,INTERNAL,
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103635,104253,619,INTERNAL,END: start -153 GT
102918,103000,83,INTERNAL,START: end 2 GT
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2032766,2032987,222,INTERNAL,EXACT,AG-GT
2032551,2032616,66,INTERNAL,EXACT,AG-GT
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6519699,6519742,44,INTERNAL,EXACT,AG-GT
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