Table S1: The information of BTV strains in this study.

| No. | Accession no. | Country | Host | Isolation | ENC | %GC3 |
|-----|---------------|---------|------|-----------|-----|------|
| 1   | MG206077.1-MG206086.1 | China | cattle | 5149E | 54.73 | 43.04 |
| 2   | KP339154.1-KP339163.1 | India | sheep | BTV02IND1993 | 54.86 | 42.95 |
| 3   | KP339234.1-KP339243.1 | India | sheep | KMN07/05 | 54.73 | 43.10 |
| 4   | KP339224.1-KP339233.1 | India | sheep | BTV16IND2010-VC07 | 54.66 | 43.42 |
| 5   | KP339164.1-KP339173.1 | India | sheep | BTV02IND2010-KRM08 | 54.75 | 43.32 |
| 6   | KX599359.1-KX599368.1 | Brazil | white-tailed deer | BRA73 | 54.21 | 42.60 |
| 7   | KX164149.1-KX164158.1 | USA | white-tailed deer | USA2007/FL 520518 | 55.26 | 43.72 |
| 8   | KX164129.1-KX164138.1 | USA | cattle | USA2003/FL 280559-3 | 54.38 | 43.36 |
| 9   | KX164109.1-KX164118.1 | USA | domestic sheep | USA2003/FL 279313 | 54.77 | 43.67 |
| 10  | KX164099.1-KX164108.1 | USA | pronghorn antelope | USA2013/CA 13-034210 | 55.26 | 43.43 |
| 11  | KX164089.1-KX164098.1 | USA | white-tailed deer | USA2012/LA 12-046093 | 55.09 | 43.44 |
| 12  | KX164079.1-KX164088.1 | USA | white-tailed deer | USA2008/TX 576181 | 55.31 | 44.53 |
| 13  | KX164069.1-KX164078.1 | USA | deer | USA2008/FL 576307 | 54.82 | 43.11 |
| 14  | KX164049.1-KX164058.1 | USA | cattle | USA2015/TX 15-029176 | 54.43 | 42.92 |
| 15  | JX003687.1-JX003696.1 | India | sheep | Ind-R1-2007 | 54.81 | 43.21 |
| 16  | KU760997.1-KU761006.1 | France | goat (Capra aegagrus hircus) | BTV-27/FRA2014/s03 | 53.78 | 41.70 |
| 17  | KU760987.1-KU760996.1 | France | goat (Capra aegagrus hircus) | BTV-27/FRA2014/s02 | 53.62 | 42.36 |
| 18  | KT002578.1-KT002587.1 | China | cattle | GDST008 | 55.41 | 43.92 |
| 19  | JX399148.1-JX399157.1 | China | sheep | K23/08 | 55.34 | 43.01 |
| 20  | KY654328.1-KY654337.1 | France | sheep | BTV-4/16-03 | 55.53 | 43.77 |
| 21  | KY049853.1-KY049862.1 | France | bovine | BTV-1/15.01 (5370) | 54.79 | 42.74 |
| 22  | KY049843.1-KY049852.1 | France | bovine | BTV-1/11-01 (4074) | 54.66 | 42.30 |
| 23  | KF664133.1-KF664142.1 | India | goat; breed: Mehsana | G53/ABT/HSR | 54.56 | 43.16 |
| 24  | KF664123.1-KF664132.1 | India | sheep | NRT37/ABT/HSR | 55.29 | 42.88 |
| 25  | KF664113.1-KF664122.1 | India | Culicoides oxystoma | SKN7/ABT/HSR | 55.07 | 42.49 |
| 26  | KF664103.1-KF664112.1 | India | sheep | K31-08/ABT/HSR | 54.60 | 43.24 |
| 27  | KJ019205.1-KJ019214.1 | Italy | sheep | BTV-1 SAD2013 | 54.98 | 43.39 |
| 28  | KJ577094.1-KJ577103.1 | Italy | sheep | SAD2012 | 54.98 | 43.41 |
| No. | Accession  | Origin       | Species    | Description                  | Identity No. | Identity Type | Identity No. | Group APMV | Group BTV Summary | Group O Summary | Group MLV | Group MLV Summary | Group O Summary | Group MLV | Group MLV Summary | Group O Summary |
|-----|------------|--------------|------------|------------------------------|--------------|---------------|--------------|------------|-------------------|----------------|----------|--------------------|----------------|----------|--------------------|----------------|
| 29  | KF560417.1-KF560426.1 | India | sheep | WGV103/ABT/HSR | 54.99 | 43.68 |
| 30  | KJ577104.1-KJ577113.1 | Tunisia | sheep | TUN2011 | 54.96 | 43.33 |
| 31  | KJ577114.1-KJ577123.1 | Italy | sheep | SAD2010 | 54.95 | 43.49 |
| 32  | KP339244.1-KP339253.1 | India | sheep | BTV10IND2003K3 | 54.95 | 43.14 |
| 33  | KP339184.1-KP339193.1 | India | sheep | BTV09IND2003-M11 | 55.01 | 43.44 |
| 34  | KP339174.1-KP339183.1 | India | sheep | BTV09IND2003-M10 | 55.02 | 43.43 |
| 35  | KP339214.1-KP339223.1 | India | sheep | BTV16IND2011-NR82 | 54.78 | 43.57 |
| 36  | KP339204.1-KP339213.1 | India | sheep | BTV16IND2010-AP06 | 54.69 | 43.37 |
| 37  | KP339194.1-KP339203.1 | India | sheep | BTV16IND2010-AP04 | 54.67 | 43.32 |
| 38  | KP339144.1-KP339153.1 | India | sheep | BTV01IND2010-VC12 | 55.34 | 43.08 |
| 39  | KP339134.1-KP339143.1 | India | sheep | BTV01IND2010-KRM07 | 55.13 | 42.71 |
| 40  | KC662612.1-KC662621.1 | India | sheep | INDAPDBNMO1/11 | 55.10 | 42.87 |
| 41  | KX164039.1-KX164048.1 | USA | deer | USA2012/SD 12-035694 | 54.99 | 43.13 |
| 42  | KX164029.1-KX164038.1 | USA | white-tailed deer | USA2008/AR 566195 | 55.29 | 44.11 |
| 43  | KX164019.1-KX164028.1 | USA | domestic sheep | USA2010/FL 10-044273 | 54.66 | 43.85 |
| 44  | KT885075.1-KT885084.1 | South Africa | Bos taurus | B.taurus-tc/ZAF/2014/Onderstepoor-BTV-9_buffycoat_Bos_taurus_plaque2B | 55.43 | 43.31 |
| 45  | KT885065.1-KT885074.1 | South Africa | Ovis aries | O.aries-vaccine/ZAF/2014/Onderstepoort-OBPvaccine-batch115-expiry11102015-MLV11 | 55.63 | 44.37 |
| 46  | KT885055.1-KT885064.1 | South Africa | Ovis aries | O.aries-vaccine/ZAF/2014/Onderstepoort-OBP_vaccinebottleB_batch115 | 55.45 | 43.31 |
| 47  | KJ736001.1-KJ736010.1 | Italy | none | SAD2006 | 55.05 | 43.60 |
| 48  | KX164139.1-KX164148.1 | USA | domestic sheep | USA2005/FL 402286 | 54.80 | 43.62 |
| 49  | KX164119.1-KX164128.1 | USA | white-tailed deer | USA2014/FL 15-008010 | 54.99 | 44.06 |
| 50  | KX164059.1-KX164068.1 | USA | cattle | USA2003/FL 280559-7 | 54.38 | 43.09 |
| Accession No.  | CAI(\textit{O. aries}) | CAI(\textit{B. taurus}) | CAI(\textit{Culicoides}) | CAI(BTV) |
|---------------|-------------------------|--------------------------|---------------------------|---------|
| MG206077.1-MG206086.1 | 0.579                   | 0.626                    | 0.553                     | 0.579   |
| KP339154.1-KP339163.1 | 0.581                   | 0.628                    | 0.555                     | 0.580   |
| KP339234.1-KP339243.1 | 0.578                   | 0.625                    | 0.551                     | 0.576   |
| KP339224.1-KP339233.1 | 0.581                   | 0.628                    | 0.55                      | 0.574   |
| KP339164.1-KP339173.1 | 0.583                   | 0.629                    | 0.553                     | 0.577   |
| KX599359.1-KX599368.1 | 0.582                   | 0.626                    | 0.557                     | 0.579   |
| KX164149.1-KX164158.1 | 0.587                   | 0.633                    | 0.548                     | 0.585   |
| KX164129.1-KX164138.1 | 0.581                   | 0.628                    | 0.549                     | 0.561   |
| KX164109.1-KX164118.1 | 0.583                   | 0.628                    | 0.546                     | 0.579   |
| KX164099.1-KX164108.1 | 0.587                   | 0.633                    | 0.55                      | 0.575   |
| KX164089.1-KX164098.1 | 0.585                   | 0.629                    | 0.549                     | 0.586   |
| KX164079.1-KX164088.1 | 0.586                   | 0.63                      | 0.541                     | 0.579   |
| KX164069.1-KX164078.1 | 0.582                   | 0.628                    | 0.549                     | 0.576   |
| KX164049.1-KX164058.1 | 0.586                   | 0.63                      | 0.554                     | 0.570   |
| JX003687.1-JX003696.1 | 0.582                   | 0.629                    | 0.553                     | 0.584   |
| KU760997.1-KU761006.1 | 0.567                   | 0.615                    | 0.55                      | 0.569   |
| KU760987.1-KU760996.1 | 0.574                   | 0.618                    | 0.547                     | 0.574   |
| KT002578.1-KT002587.1 | 0.585                   | 0.631                    | 0.547                     | 0.602   |

Table S2: Codon adaptation index (CAI) Value
| GenBank accession  | 1st nucleotide % | 2nd nucleotide % | 3rd nucleotide % | 4th nucleotide % | 5th nucleotide % |
|-------------------|------------------|------------------|------------------|------------------|-----------------|
| JX399148.1-JX399157.1 | 0.582 | 0.627 | 0.55 | 0.589 |
| KY654328.1-KY654337.1 | 0.588 | 0.633 | 0.545 | 0.598 |
| KY049853.1-KY049862.1 | 0.585 | 0.63 | 0.553 | 0.582 |
| KY049843.1-KY049852.1 | 0.579 | 0.625 | 0.555 | 0.578 |
| KF664133.1-KF664142.1 | 0.579 | 0.627 | 0.552 | 0.573 |
| KF664123.1-KF664132.1 | 0.583 | 0.627 | 0.552 | 0.587 |
| KF664113.1-KF664122.1 | 0.582 | 0.627 | 0.555 | 0.584 |
| KF664103.1-KF664112.1 | 0.579 | 0.627 | 0.551 | 0.574 |
| KJ019205.1-KJ019214.1 | 0.587 | 0.632 | 0.548 | 0.600 |
| KJ577094.1-KJ577103.1 | 0.587 | 0.632 | 0.548 | 0.601 |
| KF560417.1-KF560426.1 | 0.583 | 0.629 | 0.55 | 0.577 |
| KJ577104.1-KJ577113.1 | 0.588 | 0.633 | 0.55 | 0.600 |
| KJ577114.1-KJ577123.1 | 0.587 | 0.632 | 0.548 | 0.597 |
| KP339244.1-KP339253.1 | 0.582 | 0.629 | 0.551 | 0.577 |
| KP339184.1-KP339193.1 | 0.583 | 0.63 | 0.551 | 0.587 |
| KP339174.1-KP339183.1 | 0.583 | 0.63 | 0.551 | 0.586 |
| KP339214.1-KP339223.1 | 0.584 | 0.63 | 0.548 | 0.576 |
| KP339204.1-KP339213.1 | 0.581 | 0.628 | 0.55 | 0.571 |
| KP339194.1-KP339203.1 | 0.581 | 0.628 | 0.551 | 0.571 |
| KP339144.1-KP339153.1 | 0.583 | 0.628 | 0.55 | 0.587 |
| KP339134.1-KP339143.1 | 0.58 | 0.625 | 0.553 | 0.581 |
| Accession Numbers | Value1 | Value2 | Value3 | Value4 |
|-------------------|--------|--------|--------|--------|
| KC662612.1-KC662621.1 | 0.578  | 0.625  | 0.553  | 0.583  |
| KX164039.1-KX164048.1 | 0.582  | 0.628  | 0.55   | 0.578  |
| KX164029.1-KX164038.1 | 0.588  | 0.634  | 0.547  | 0.581  |
| KX164019.1-KX164028.1 | 0.584  | 0.63   | 0.545  | 0.583  |
| KT885075.1-KT885084.1 | 0.582  | 0.628  | 0.55   | 0.572  |
| KT885065.1-KT885074.1 | 0.59   | 0.634  | 0.545  | 0.590  |
| KT885055.1-KT885064.1 | 0.582  | 0.628  | 0.549  | 0.572  |
| KJ736001.1-KJ736010.1 | 0.588  | 0.633  | 0.548  | 0.598  |
| KX164139.1-KX164148.1 | 0.584  | 0.63   | 0.549  | 0.586  |
| KX164119.1-KX164128.1 | 0.587  | 0.633  | 0.544  | 0.577  |
| KX164059.1-KX164068.1 | 0.58   | 0.626  | 0.551  | 0.574  |
| Mean±              | 0.583  | 0.629  | 0.55   | 0.582  |
| STD                | 0.004  | 0.004  | 0.003  | 0.009  |