

Additional File 5: Differential expression of stress-related genes

| Gene symbol | Target ID                       | Description                                                                                                                    | Relative gene expression level in PX entroids vs. PO organoids |             |              |             |             |
|-------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|-------------|--------------|-------------|-------------|
|             |                                 |                                                                                                                                | P1 entroids                                                    | P2 entroids | P3 entroids  | P4 entroids | P5 entroids |
| ABCB4       | g 741923343 ref NM_010804130.1  | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X1, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121203 ref NM_010804131.2 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X2, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121204 ref NM_010804132.1 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X3, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121206 ref NM_010804133.1 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X4, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121208 ref NM_005205302.3 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X5, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121210 ref NM_010804709.1 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X6, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121212 ref NM_010804710.1 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X7, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121214 ref NM_005205304.3 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X8, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ABCB4       | g 9829121215 ref NM_005205305.3 | PREDICTED: Bos taurus ATP-binding cassette, sub-family B (MDR/TAP), member 4 (ABCB4), transcript variant X9, mRNA              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| APEX1       | g 232787399 ref NM_176609.3     | Bos taurus APEX nuclease (multifunctional DNA repair enzyme) (APEX1), mRNA                                                     | 0.941004161                                                    | 1.218538713 | 1.102082215  | 0.960643136 | 0.854576193 |
| ATM         | g 329664119 ref NM_001205935.1  | Bos taurus ATM serine/threonine kinase (ATM), mRNA                                                                             | 0.614095638                                                    | 1.239859288 | 0.937575196  | 1.092183135 | 0.989668562 |
| ATM         | g 982945403 ref NM_010812321.2  | PREDICTED: Bos taurus ATM serine/threonine kinase (ATM), transcript variant X1, mRNA                                           | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| ATM         | g 982945404 ref NM_010812322.2  | PREDICTED: Bos taurus ATM serine/threonine kinase (ATM), transcript variant X2, mRNA                                           | 0.906421419                                                    | 1.014013288 | 1.11273023   | 1.093799876 | 1.174491696 |
| ATM         | g 982945405 ref NM_010812323.2  | PREDICTED: Bos taurus ATM serine/threonine kinase (ATM), transcript variant X3, mRNA                                           | 1.129486826                                                    | 1.390236937 | 0.907886399  | 1.334693463 | 0.760738893 |
| ATM         | g 982945406 ref NM_010812324.2  | PREDICTED: Bos taurus ATM serine/threonine kinase (ATM), transcript variant X4, mRNA                                           | 1.037419226                                                    | 1.216673781 | 1.108224767  | 1.042114249 | 0.681959519 |
| ATM         | g 982945407 ref NM_010812325.2  | PREDICTED: Bos taurus ATM serine/threonine kinase (ATM), transcript variant X5, mRNA                                           | 0.905940741                                                    | 1.42829218  | 0.998973224  | 0.760958912 | 1.934796479 |
| ATM         | g 982945408 ref NM_005215785.3  | PREDICTED: Bos taurus ATM serine/threonine kinase (ATM), transcript variant X6, mRNA                                           | 0.934635255                                                    | 0.972819367 | 0.991617626  | 1.050223944 | 1.121755153 |
| BRCA1       | g 30466259 ref NM_178573.1      | Bos taurus breast cancer 1, early onset (BRCA1), mRNA                                                                          | 0.987004883                                                    | 1.044260865 | 1.074959595  | 0.992371639 | 0.905436293 |
| BRCA1       | g 982957762 ref NM_005220676.3  | PREDICTED: Bos taurus breast cancer 1 (BRCA1), transcript variant X2, mRNA                                                     | 0.783053026                                                    | 1.323566554 | 1.037284062  | 0.994340077 | 0.782486876 |
| BRCA1       | g 982957763 ref NM_010812321.1  | PREDICTED: Bos taurus breast cancer 1 (BRCA1), transcript variant X3, mRNA                                                     | 0.581986689                                                    | 1.1209527   | 1.177468297  | 1.277743076 | 1.081355441 |
| BRCA1       | g 982957766 ref NM_005220679.3  | PREDICTED: Bos taurus breast cancer 1 (BRCA1), transcript variant X4, mRNA                                                     | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| BRCA2       | g 982940963 ref NM_002691807.4  | PREDICTED: Bos taurus breast cancer 2 (BRCA2), transcript variant X1, mRNA                                                     | 0.967481196                                                    | 1.169317992 | 1.067929535  | 0.945017519 | 0.977018236 |
| BRCA2       | g 982940965 ref NM_010810770.2  | PREDICTED: Bos taurus breast cancer 2 (BRCA2), transcript variant X2, mRNA                                                     | 0.68758031                                                     | 0.914749592 | 0.9003389542 | 1.048778475 | 0.840848561 |
| BRCA2       | g 982991784 ref NM_010814653.1  | PREDICTED: Bos taurus breast cancer 2 (BRCA2), transcript variant X3, mRNA                                                     | 0.736326236                                                    | 1.183361899 | 0.9945128219 | 1.363235151 | 1.043404781 |
| CANX        | g 157785566 ref NM_00105612.1   | Bos taurus calnexin (CANX), mRNA                                                                                               | 0.86317146                                                     | 1.02422298  | 0.994157827  | 1.462236012 | 0.979945445 |
| CAT         | g 402693375 ref NM_001035386.2  | Bos taurus catalase (CAT), mRNA                                                                                                | 0.916143335                                                    | 1.25955077  | 1.106197682  | 0.990230785 | 0.98528275  |
| CTC2        | g 77735434 ref NM_001034239.1   | Bos taurus chaperonin containing TCP1, subunit 2 (beta) (CTC2), mRNA                                                           | 0.879520819                                                    | 1.28425293  | 1.103907745  | 0.919406666 | 0.912187961 |
| CTC3        | g 402692562 ref NM_001017934.3  | Bos taurus chaperonin containing TCP1, subunit 3 (gamma) (CTC3), mRNA                                                          | 1.021073764                                                    | 1.120156594 | 1.097878638  | 0.982465601 | 1.023716214 |
| CTC4        | g 84003060 ref NM_001038194.1   | Bos taurus chaperonin containing TCP1, subunit 4 (delta) (CTC4), mRNA                                                          | 0.9732394                                                      | 1.177788383 | 1.083467635  | 1.012361698 | 1.004478479 |
| CTC5        | g 174325363 ref NM_001034595.2  | Bos taurus chaperonin containing TCP1, subunit 5 (epsilon) (CTC5), mRNA                                                        | 0.995029551                                                    | 1.161214607 | 1.119943228  | 0.960211739 | 0.922657423 |
| CTC6A       | g 148233485 ref NM_001034542.2  | Bos taurus chaperonin containing TCP1, subunit 6A (zeta 1) (CTC6A), mRNA                                                       | 1.073220665                                                    | 1.097720761 | 1.087498356  | 1.019665765 | 0.992454339 |
| CTC6B       | g 402744928 ref NM_001034642.2  | Bos taurus chaperonin containing TCP1, subunit 6B (zeta 2) (CTC6B), mRNA                                                       | 1.032463291                                                    | 1.053841288 | 1.080741383  | 1.036377475 | 0.994316415 |
| CTC6B       | g 982956086 ref NM_005220022.3  | PREDICTED: Bos taurus chaperonin containing TCP1 subunit 6B (CTC6B), transcript variant X1, mRNA                               | 0.681037215                                                    | 1.292493662 | 1.374321196  | 1.225848808 | 0.741462884 |
| CTC6B       | g 982956087 ref NM_005220024.3  | PREDICTED: Bos taurus chaperonin containing TCP1 subunit 6B (CTC6B), transcript variant X2, mRNA                               | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CTC6B       | g 982956089 ref NM_010815775.2  | PREDICTED: Bos taurus chaperonin containing TCP1 subunit 6B (CTC6B), transcript variant X3, mRNA                               | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CTC6B       | g 982956090 ref NM_010815775.2  | PREDICTED: Bos taurus chaperonin containing TCP1 subunit 6B (CTC6B), transcript variant X4, mRNA                               | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CTC6B       | g 982956093 ref NM_010815775.2  | PREDICTED: Bos taurus chaperonin containing TCP1 subunit 6B (CTC6B), transcript variant X5, mRNA                               | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CTC7        | g 402692506 ref NM_001034617.2  | Bos taurus chaperonin containing TCP1, subunit 7 (eta) (CTC7), mRNA                                                            | 1.006891526                                                    | 1.127686063 | 1.083682503  | 0.964893743 | 1.006084386 |
| CTC8        | g 758129121 ref NM_001033069.1  | Bos taurus chaperonin containing TCP1, subunit 8 (theta) (CTC8), mRNA                                                          | 0.998205914                                                    | 1.12318961  | 1.099425139  | 0.986212878 | 1.027009542 |
| CTC8        | g 982909446 ref NM_005201119.3  | PREDICTED: Bos taurus chaperonin containing TCP1 subunit 8 (CTC8), transcript variant X1, mRNA                                 | 0.821227862                                                    | 1.08192544  | 1.348590066  | 1.03409237  | 0.874509293 |
| CDKN1A      | g 402692179 ref NM_001089896.2  | Bos taurus cyclin-dependent kinase inhibitor 1A (p21, Cip1) (CDKN1A), mRNA                                                     | 0.665424068                                                    | 1.618652958 | 1.467499816  | 0.553772382 | 1.033420244 |
| CDKN1A      | g 982963239 ref NM_005223326.3  | PREDICTED: Bos taurus cyclin-dependent kinase inhibitor 1A (p21, Cip1) (CDKN1A), transcript variant X1, mRNA                   | 0.733788884                                                    | 1.587107836 | 1.354858865  | 0.6711378   | 1.054940655 |
| CLGN        | g 402691836 ref NM_001034205.2  | Bos taurus calmagin (CLGN), mRNA                                                                                               | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CRYBA1      | g 402692289 ref NM_174523.3     | Bos taurus crystallin, beta A1 (CRYBA1), mRNA                                                                                  | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CRYBA2      | g 31341762 ref NM_174524.2      | Bos taurus crystallin, beta A2 (CRYBA2), mRNA                                                                                  | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CRYGA       | g 343780969 ref NM_001243570.1  | Bos taurus crystallin, gamma A (CRYGA), mRNA                                                                                   | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CRYZ        | g 114326273 ref NM_174025.3     | Bos taurus crystallin, zeta (quionone reductase) (CRYZ), mRNA                                                                  | 1.047774101                                                    | 1.186069033 | 1.022079164  | 1.023456293 | 0.841724335 |
| CYP17A1     | g 451958132 ref NM_174304.2     | Bos taurus cytochrome P450, family 17, subfamily A, polypeptide 1 (CYP17A1), mRNA                                              | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CYP12A      | g 982960435 ref NM_010817139.2  | PREDICTED: Bos taurus cytochrome P450, family 1, subfamily A, polypeptide 2 (CYP12A2), transcript variant X1, mRNA             | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CYP24A1     | g 300794134 ref NM_001191417.1  | Bos taurus cytochrome P450, family 24, subfamily A, polypeptide 1 (CYP24A1), nuclear gene encoding mitochondrial protein, mRNA | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CYP2E1      | g 724470721 ref NM_174303.3     | Bos taurus cytochrome P450, family 2, subfamily E, polypeptide 1 (CYP2E1), mRNA                                                | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CYP4B1      | g 402745168 ref NM_001076202.2  | Bos taurus cytochrome P450, family 4, subfamily B, polypeptide 1 (CYP4B1), mRNA                                                | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| CYP7A1      | g 329664101 ref NM_001205677.1  | Bos taurus cytochrome P450, family 7, subfamily A, polypeptide 1 (CYP7A1), mRNA                                                | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| DOT13       | g 118151443 ref NM_001078163.1  | Bos taurus DNA-damage-inducible transcript 3 (DOT13), mRNA                                                                     | 0.90172702                                                     | 1.193414253 | 0.80703473   | 0.996768982 | 0.98345613  |
| DNAJC1      | g 982942340 ref NM_010814740.3  | PREDICTED: Bos taurus DnaJ heat shock protein family (Hsp40) member C1 (DNAJC1), mRNA                                          | 0.893005052                                                    | 1.165122413 | 1.126346439  | 0.992416658 | 0.9060385   |
| DNTT        | g 31343510 ref NM_177495.2      | Bos taurus DNA nucleotidylexotransferase (DNTT), mRNA                                                                          | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| DNTT        | g 741975692 ref NM_005225429.2  | PREDICTED: Bos taurus DNA nucleotidylexotransferase (DNTT), transcript variant X1, mRNA                                        | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| DNTT        | g 741975693 ref NM_005225430.2  | PREDICTED: Bos taurus DNA nucleotidylexotransferase (DNTT), transcript variant X2, mRNA                                        | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| EPHX2       | g 115495832 ref NM_001075534.1  | Bos taurus epoxide hydrolase 2, cytoplasmic (EPHX2), mRNA                                                                      | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| EPHX2       | g 982933980 ref NM_010814763.1  | PREDICTED: Bos taurus epoxide hydrolase 2 (EPHX2), transcript variant X1, mRNA                                                 | 1.024419557                                                    | 1.413858419 | 0.411515022  | 1.715009939 | 0.406260539 |
| EPHX2       | g 982933982 ref NM_005210301.3  | PREDICTED: Bos taurus epoxide hydrolase 2 (EPHX2), transcript variant X2, mRNA                                                 | 0.3921622                                                      | 2.03361109  | 0.630897058  | 0.588396134 | 0.91432068  |
| ERCC1       | g 402692069 ref NM_001076385.2  | Bos taurus excision repair cross-complementation group 1 (ERCC1), mRNA                                                         | 0.90784024                                                     | 1.152568573 | 1.09905978   | 1.073134808 | 0.923407977 |
| ERCC1       | g 982953638 ref NM_005219335.2  | PREDICTED: Bos taurus excision repair cross-complementation group 1 (ERCC1), transcript variant X1, mRNA                       | 1.070034986                                                    | 0.935667158 | 1.593185854  | 1.226714725 | 0.389372774 |
| ERCC1       | g 982953640 ref NM_010815082.2  | PREDICTED: Bos taurus excision repair cross-complementation group 1 (ERCC1), transcript variant X2, mRNA                       | 1.136719668                                                    | 1.029257106 | 1.02858969   | 1.00446662  | 1.08248456  |
| ERCC1       | g 982953642 ref NM_005219337.2  | PREDICTED: Bos taurus excision repair cross-complementation group 1 (ERCC1), transcript variant X3, mRNA                       | 0.623046119                                                    | 1.859997286 | 0.742357708  | 1.045942313 | 1.38303868  |
| ERCC3       | g 982953644 ref NM_005219336.3  | PREDICTED: Bos taurus excision repair cross-complementation group 1 (ERCC1), transcript variant X4, mRNA                       | 0.499256298                                                    | 0.83707021  | 1.127473356  | 1.035209511 | 1.16956879  |
| ERCC3       | g 114059088 ref NM_001045988.1  | Bos taurus excision repair cross-complementation group 3 (ERCC3), mRNA                                                         | 0.903082082                                                    | 1.254484263 | 0.952641599  | 1.063502674 | 0.981708453 |
| ERCC3       | g 982912883 ref NM_010814741.1  | PREDICTED: Bos taurus excision repair cross-complementation group 3 (ERCC3), transcript variant X1, mRNA                       | 1.925437745                                                    | 0.576881886 | 1.446503808  | 1.108965655 | 1.254972529 |
| ERCC5       | g 402743131 ref NM_001035276.2  | Bos taurus excision repair cross-complementation group 5 (ERCC5), mRNA                                                         | 0.868571046                                                    | 1.147413521 | 0.93769878   | 1.00199128  | 1.0275853   |
| FOX1        | g 30842789 ref NM_180111.2      | Bos taurus ferredoxin 1 (FOX1), mRNA                                                                                           | 1.029500981                                                    | 1.369137699 | 1.082157346  | 0.96838896  | 0.822557177 |
| FKBP1A      | g 718365304 ref NM_001035456.1  | Bos taurus FK506 binding protein 1A, 12kDa (FKBP1A), mRNA                                                                      | 0.706002889                                                    | 2.294365314 | 1.171902961  | 0.904460555 | 1.335137854 |
| FKBP2       | g 164448579 ref NM_001113256.1  | Bos taurus FK506 binding protein 2, 13kDa (FKBP2), transcript variant 1, mRNA                                                  | 0.872931231                                                    | 1.623260855 | 0.944484141  | 1.11294887  | 1.054967515 |
| FKBP2       | g 82697384 ref NM_001037481.1   | Bos taurus FK506 binding protein 2, 13kDa (FKBP2), transcript variant 2, mRNA                                                  | 1.036533544                                                    | 0.934544709 | 1.528353815  | 0.478550492 | 1.310548265 |
| FKBP2       | g 982972005 ref NM_005227147.3  | PREDICTED: Bos taurus FK506 binding protein 2 (FKBP2), transcript variant X1, mRNA                                             | 1.095853946                                                    | 1.019412286 | 1.173188993  | 0.757502758 | 0.93325536  |
| FKBP2       | g 982972006 ref NM_005227148.3  | PREDICTED: Bos taurus FK506 binding protein 2 (FKBP2), transcript variant X2, mRNA                                             | 1.07406259                                                     | 1.209324805 | 1.137360531  | 0.887410855 | 1.173493328 |
| FKBP2       | g 982972007 ref NM_005227149.3  | PREDICTED: Bos taurus FK506 binding protein 2 (FKBP2), transcript variant X3, mRNA                                             | 1.599723023                                                    | 0.834180538 | 1.419293191  | 0.438541621 | 1.901797548 |
| FMO1        | g 329664185 ref NM_001206199.1  | Bos taurus flavin containing monooxygenase 1 (FMO1), mRNA                                                                      | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| FMO1        | g 741945096 ref NM_010813214.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X3, mRNA                                    | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| FMO1        | g 741945098 ref NM_010813215.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X4, mRNA                                    | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| FMO1        | g 982947801 ref NM_010813216.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X5, mRNA                                    | 1.072896334                                                    | 0.974687932 | 1.198641635  | 0.600797598 | 1.000703293 |
| FMO1        | g 982947803 ref NM_010813217.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X6, mRNA                                    | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| FMO1        | g 982947804 ref NM_010813218.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X7, mRNA                                    | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| FMO1        | g 982947805 ref NM_010813219.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X8, mRNA                                    | 0.758015812                                                    | 1.033047466 | 0.865325084  | 1.477272435 | 0.855692217 |
| FMO1        | g 982947806 ref NM_010813220.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X9, mRNA                                    | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| FMO1        | g 982947807 ref NM_010813221.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X10, mRNA                                   | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| FMO1        | g 982947809 ref NM_010813222.1  | PREDICTED: Bos taurus flavin containing monooxygenase 1 (FMO1), transcript variant X11, mRNA                                   | n.a.                                                           | n.a.        | n.a.         | n.a.        | n.a.        |
| GADD45A     | g 77735448 ref NM_001034247.1   | Bos taurus growth arrest and DNA-damage-inducible, alpha (GADD45A), mRNA                                                       | 1.048970702                                                    | 1.490880612 | 0.94416656   | 1.048439369 | 0.890355445 |
| GF2FH1      | g 114052005 ref NM_001061510.1  | Bos taurus general transcription factor IIH, polypeptide 1, 620kDa (GF2FH1), mRNA                                              | 0.949252416                                                    | 1.143807523 | 0.997050036  | 1.025855571 | 0.925557331 |
| HIVEP1      | g 982964805 ref NM_010816908.2  | PREDICTED: Bos taurus human immunodeficiency virus type 1 enhancer binding protein 1 (HIVEP1), mRNA                            | 0.762546793                                                    | 1.098617906 | 0.945126376  | 1.133187861 | 1.029490425 |
| HMOX1       | g 62460519 ref NM_001014162.1   | Bos taurus heme oxygenase (decycling) 1 (HMOX1), mRNA                                                                          | 0.723575142                                                    | 1.268655414 | 1.06         |             |             |

|        |                                 |                                                                                                                    |              |             |              |             |             |
|--------|---------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------|-------------|--------------|-------------|-------------|
| MDM2   | g 741926373 ref NM_010805086.1  | PREDICTED: Bos taurus MDM2 proto-oncogene, E3 ubiquitin protein ligase (MDM2), transcript variant X3, mRNA         | 0.994711412  | 1.111988722 | 0.9510194    | 1.103895196 | 0.962389421 |
| MPG    | g 982966004 ref NM_010800800.2  | PREDICTED: Bos taurus N-methylpurine DNA glycosylase (MPG), mRNA                                                   | 1.035656171  | 1.183916381 | 1.212524113  | 0.822876536 | 0.906911187 |
| MSH2   | g 77736114 ref NM_001034584.1   | Bos taurus mutS homolog 2 (MSH2), mRNA                                                                             | 0.937165829  | 1.154104887 | 1.057713177  | 1.000061037 | 0.868543196 |
| MSH3   | g 156121254 ref NM_001102305.1  | Bos taurus mutS homolog 3 (MSH3), mRNA                                                                             | 0.94471325   | 1.105616346 | 0.98908077   | 1.061060736 | 0.95480106  |
| MSH6   | g 300794941 ref NM_001192737.1  | Bos taurus mutS homolog 6 (MSH6), mRNA                                                                             | 0.57322294   | 1.438994285 | 1.380142271  | 1.030779817 | 0.91491495  |
| MYO1A  | g 402745680 ref NM_174395.3     | Bos taurus myosin IA (MYO1A), mRNA                                                                                 | 1.24341986   | 2.073783016 | 0.348078712  | 1.361289113 | 0.844586021 |
| MYO1A  | g 982925555 ref NM_015471065.1  | PREDICTED: Bos taurus myosin IA (MYO1A), transcript variant X1, mRNA                                               | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| MYO1A  | g 982925558 ref NM_005206510.3  | PREDICTED: Bos taurus myosin IA (MYO1A), transcript variant X2, mRNA                                               | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| MYO1A  | g 982925559 ref NM_015471066.1  | PREDICTED: Bos taurus myosin IA (MYO1A), transcript variant X3, mRNA                                               | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| MYO1A  | g 982925562 ref NM_015471067.1  | PREDICTED: Bos taurus myosin IA (MYO1A), transcript variant X4, mRNA                                               | 1.698521469  | 2.199563227 | 0.359191914  | 1.231714118 | 0.884197596 |
| NEDD8  | g 75832073 ref NM_174764.6      | Bos taurus neural precursor cell expressed, developmentally down-regulated 8 (NEDD8), mRNA                         | 0.941996123  | 1.148648782 | 1.081308036  | 1.018561258 | 0.971635334 |
| NPM1   | g 982959144 ref NM_005221418.3  | PREDICTED: Bos taurus nucleophosmin (nucleolar phosphoprotein B23, nucleatrin) (NPM1), transcript variant X1, mRNA | 0.943187828  | 1.239151157 | 1.163760786  | 0.991481674 | 0.868870856 |
| NQO1   | g 77736016 ref NM_001034535.1   | Bos taurus NAD(P)H dehydrogenase, quinone 1 (NQO1), mRNA                                                           | 1.373471705  | 1.054210867 | 0.957674271  | 0.993931191 | 1.375545335 |
| NUDT1  | g 741975375 ref NM_002698230.4  | PREDICTED: Bos taurus nudix hydrolase 1 (NUDT1), transcript variant X4, mRNA                                       | 0.906372387  | 1.217718039 | 1.148819717  | 0.569635984 | 0.875892473 |
| NUDT1  | g 982967661 ref NM_015460537.1  | PREDICTED: Bos taurus nudix hydrolase 1 (NUDT1), transcript variant X1, mRNA                                       | 0.754532358  | 0.683175591 | 1.383637431  | 1.064351468 | 1.203655087 |
| NUDT1  | g 982967663 ref NM_015460538.1  | PREDICTED: Bos taurus nudix hydrolase 1 (NUDT1), transcript variant X2, mRNA                                       | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| NUDT1  | g 982967665 ref NM_002698231.5  | PREDICTED: Bos taurus nudix hydrolase 1 (NUDT1), transcript variant X3, mRNA                                       | 1.060544739  | 1.092396155 | 0.979167629  | 1.256858754 | 0.714085158 |
| ODC1   | g 312129301 ref NM_174130.2     | Bos taurus ornithine decarboxylase 1 (ODC1), mRNA                                                                  | 1.576610269  | 0.563899739 | 1.146081406  | 1.42958416  | 0.822809813 |
| ODC1   | g 982939264 ref NM_015473527.1  | PREDICTED: Bos taurus ornithine decarboxylase 1 (ODC1), transcript variant X1, mRNA                                | 0.960957429  | 1.095646333 | 1.071376011  | 0.945184556 | 0.905667794 |
| ODC1   | g 982939267 ref NM_005212918.2  | PREDICTED: Bos taurus ornithine decarboxylase 1 (ODC1), transcript variant X2, mRNA                                | 0.906377509  | 1.153924078 | 1.125413785  | 0.878573521 | 0.829573407 |
| ODC1   | g 982939268 ref NM_010810165.2  | PREDICTED: Bos taurus ornithine decarboxylase 1 (ODC1), transcript variant X3, mRNA                                | 0.953260462  | 1.010532053 | 1.177467506  | 0.932460985 | 1.061246729 |
| ODC1   | g 982939267 ref NM_005212919.3  | PREDICTED: Bos taurus ornithine decarboxylase 1 (ODC1), transcript variant X4, mRNA                                | 1.115985034  | 1.048576968 | 0.953827226  | 1.074475425 | 0.901959142 |
| OGG1   | g 161760648 ref NM_001080285.2  | Bos taurus 8-oxoguanine DNA glycosylase (OGG1), mRNA                                                               | 1.016276491  | 1.082405383 | 1.053445033  | 1.021959824 | 0.95296451  |
| PARP1  | g 313440848 ref NM_174751.2     | Bos taurus poly (ADP-ribose) polymerase 1 (PARP1), mRNA                                                            | 0.841444081  | 1.173815071 | 0.962986268  | 1.113328501 | 0.843475061 |
| PARP1  | g 982947667 ref NM_005216796.3  | PREDICTED: Bos taurus poly(ADP-ribose) polymerase 1 (PARP1), transcript variant X1, mRNA                           | 0.82609714   | 1.206251933 | 0.997823079  | 1.079833069 | 0.893837229 |
| PCNA   | g 77735938 ref NM_001034494.1   | Bos taurus proliferating cell nuclear antigen (PCNA), mRNA                                                         | 0.955761286  | 1.127808272 | 1.157219131  | 0.991995505 | 0.890437077 |
| PDIA3  | g 148230373 ref NM_174333.3     | Bos taurus protein disulfide isomerase family A, member 3 (PDIA3), mRNA                                            | 0.846261256  | 1.187906668 | 1.119674102  | 1.019620564 | 0.972291964 |
| PDIA4  | g 402744406 ref NM_001054879.2  | Bos taurus protein disulfide isomerase family A, member 4 (PDIA4), mRNA                                            | 0.961469647  | 1.204070069 | 1.168899038  | 0.975946605 | 1.045909882 |
| PMS2   | g 329664143 ref NM_001205938.1  | Bos taurus PMS2 postmeiotic segregation increased 2 (S. cerevisiae) (PMS2), mRNA                                   | 0.863261125  | 1.148062368 | 1.013258785  | 1.118158155 | 0.871333279 |
| POLA1  | g 329663229 ref NM_001206065.1  | Bos taurus polymerase (DNA directed), alpha 1, catalytic subunit (POLA1), mRNA                                     | 0.668477292  | 1.500329801 | 0.961017155  | 0.875477651 | 1.322396719 |
| POLA1  | g 982974544 ref NM_005228356.3  | PREDICTED: Bos taurus polymerase (DNA directed), alpha 1, catalytic subunit (POLA1), transcript variant X1, mRNA   | 0.913137535  | 1.186984887 | 0.928153776  | 1.077403723 | 1.305551599 |
| POLA1  | g 982974545 ref NM_015461765.1  | PREDICTED: Bos taurus polymerase (DNA directed), alpha 1, catalytic subunit (POLA1), transcript variant X2, mRNA   | 0.84899228   | 0.89193204  | 1.393388532  | 0.898093573 | 1.31698992  |
| POLA1  | g 982974548 ref NM_005228359.3  | PREDICTED: Bos taurus polymerase (DNA directed), alpha 1, catalytic subunit (POLA1), transcript variant X3, mRNA   | 0.758614303  | 0.676167659 | 1.725528707  | 0.893270635 | 1.556323526 |
| POLA1  | g 982974549 ref NM_005228360.3  | PREDICTED: Bos taurus polymerase (DNA directed), alpha 1, catalytic subunit (POLA1), transcript variant X4, mRNA   | 0.997937244  | 0.930003591 | 0.954610681  | 1.347290893 | 0.959894049 |
| POLA1  | g 982974550 ref NM_015461766.1  | PREDICTED: Bos taurus polymerase (DNA directed), alpha 1, catalytic subunit (POLA1), transcript variant X5, mRNA   | 1.370377387  | 1.00600603  | 2.428314318  | 0.958525426 | 0.575931056 |
| POLD1  | g 31342028 ref NM_174427.2      | Bos taurus polymerase (DNA directed), delta 1, catalytic subunit (POLD1), mRNA                                     | 0.991833836  | 1.171029272 | 1.113469435  | 0.909290574 | 0.889237511 |
| PON1   | g 402744865 ref NM_001046269.2  | Bos taurus paraoxonase 1 (PON1), mRNA                                                                              | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| PON2   | g 61888861 ref NM_001013588.1   | Bos taurus paraoxonase 2 (PON2), mRNA                                                                              | 0.892192684  | 1.15777888  | 0.912032203  | 1.170340385 | 1.141133021 |
| PON3   | g 115496164 ref NM_001075479.1  | Bos taurus paraoxonase 3 (PON3), mRNA                                                                              | 1.153784891  | 1.466611446 | 0.452596817  | 1.673290767 | 1.11804504  |
| PON3   | g 982920878 ref NM_010803994.2  | PREDICTED: Bos taurus paraoxonase 3 (PON3), transcript variant X1, mRNA                                            | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| PPARA  | g 77404270 ref NM_001034036.1   | Bos taurus peroxisome proliferator-activated receptor alpha (PPARA), mRNA                                          | 0.908813563  | 1.111478441 | 0.858821751  | 1.122811141 | 0.895188849 |
| PPARA  | g 982927529 ref NM_005207472.3  | PREDICTED: Bos taurus peroxisome proliferator-activated receptor alpha (PPARA), transcript variant X1, mRNA        | 0.842282631  | 1.092204836 | 0.990435196  | 0.968223044 | 1.066717022 |
| PPARA  | g 982927530 ref NM_015471442.1  | PREDICTED: Bos taurus peroxisome proliferator-activated receptor alpha (PPARA), transcript variant X2, mRNA        | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| PPARA  | g 982927532 ref NM_010805796.2  | PREDICTED: Bos taurus peroxisome proliferator-activated receptor alpha (PPARA), transcript variant X3, mRNA        | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| PPARD  | g 139948624 ref NM_001083636.1  | Bos taurus peroxisome proliferator-activated receptor delta (PPARD), mRNA                                          | 0.700228815  | 1.303122986 | 0.70828073   | 1.277438165 | 0.940623921 |
| PPARG  | g 31341398 ref NM_181024.2      | Bos taurus peroxisome proliferator-activated receptor delta (PPARG), mRNA                                          | 2.458018265  | 2.052643046 | 0.516146152  | 1.400816532 | 1.294495005 |
| PTGS1  | g 198282106 ref NM_001105323.1  | Bos taurus prostaglandin-endoperoxide synthase 1 (prostaglandin G/H synthase and cyclooxygenase) (PTGS1), mRNA     | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| RAD23A | g 129277536 ref NM_001082614.1  | Bos taurus RAD23 homolog A (S. cerevisiae) (RAD23A), mRNA                                                          | 1.006076694  | 1.098301386 | 1.083049274  | 0.885850199 | 1.094514856 |
| RAD23A | g 528954958 ref NM_005208675.1  | PREDICTED: Bos taurus RAD23 homolog A, nucleotide excision repair protein (RAD23A), transcript variant X1, mRNA    | 0.977507457  | 1.242794424 | 0.991577725  | 1.006741989 | 0.963253133 |
| RAD23B | g 114052666 ref NM_001046310.1  | Bos taurus RAD23 homolog B (S. cerevisiae) (RAD23B), mRNA                                                          | 1.010285683  | 1.182813358 | 1.056653953  | 0.96710471  | 0.959992247 |
| RAD50  | g 332309232 ref NM_001206868.1  | Bos taurus RAD50 homolog (S. cerevisiae) (RAD50), mRNA                                                             | 0.951306748  | 1.232718357 | 1.104708556  | 0.982987851 | 0.872715981 |
| RAD51  | g 402692337 ref NM_001046179.2  | Bos taurus RAD51 recombinase (RAD51), mRNA                                                                         | 0.1032271647 | 1.088472587 | 1.020674393  | 0.981073884 | 0.85449911  |
| RAD51  | g 982936713 ref NM_010809172.2  | PREDICTED: Bos taurus RAD51 recombinase (RAD51), transcript variant X1, mRNA                                       | 0.836401837  | 1.162132088 | 1.050147212  | 0.93146424  | 0.828807551 |
| RAD51  | g 982936714 ref NM_010809173.2  | PREDICTED: Bos taurus RAD51 recombinase (RAD51), transcript variant X2, mRNA                                       | 1.116268866  | 1.116961472 | 0.981627854  | 1.159748966 | 1.048866416 |
| RAD52  | g 98292104 ref NM_010806464.2   | PREDICTED: Bos taurus RAD52 homolog, DNA repair protein (RAD52), transcript variant X7, mRNA                       | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| RAD54L | g 195539536 ref NM_001130766.1  | Bos taurus RAD54-like (S. cerevisiae) (RAD54L), mRNA                                                               | 0.716954855  | 1.035101942 | 1.100802563  | 1.212803239 | 0.854191853 |
| RAD54L | g 1195539536 ref NM_001130766.1 | Bos taurus RAD54-like (S. cerevisiae) (RAD54L), mRNA                                                               | 0.716954855  | 1.035101942 | 1.100802563  | 1.212803239 | 0.854191853 |
| RAD54L | g 982919865 ref NM_015465835.1  | PREDICTED: Bos taurus RAD54-like (S. cerevisiae) (RAD54L), transcript variant X1, mRNA                             | 1.149675003  | 1.097010223 | 0.913015656  | 1.191275929 | 0.944057153 |
| REG3A  | g 45430002 ref NM_205787.1      | Bos taurus regenerating islet-derived 3 alpha (REG3A), mRNA                                                        | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| REG3A  | g 982938989 ref NM_005212745.2  | PREDICTED: Bos taurus regenerating islet-derived 3 alpha (REG3A), transcript variant X1, mRNA                      | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| RFC1   | g 982928293 ref NM_015471607.1  | PREDICTED: Bos taurus replication factor C subunit 1 (RFC1), transcript variant X1, mRNA                           | 0.947618784  | 1.206709016 | 1.054135125  | 1.02249923  | 0.862121841 |
| RFC1   | g 982983179 ref NM_015463745.1  | PREDICTED: Bos taurus replication factor C subunit 1 (RFC1), transcript variant X2, mRNA                           | 0.993040459  | 1.679116847 | 1.480730003  | 1.119564799 | 1.377955913 |
| RHOB   | g 1181509451 ref NM_001077922.1 | Bos taurus ras homolog family member B (RHOB), mRNA                                                                | 0.986781104  | 1.214160944 | 1.003437926  | 1.094330294 | 1.038150333 |
| RPA2   | g 402693431 ref NM_001045984.2  | Bos taurus replication protein A2, 32kDa (RPA2), mRNA                                                              | 0.932595568  | 1.14784439  | 1.070941405  | 1.005428418 | 0.889247489 |
| RP529  | g 75832074 ref NM_174804.3      | Bos taurus ribosomal protein S29 (RP529), mRNA                                                                     | 0.934387153  | 1.338010253 | 1.009206516  | 1.040664958 | 0.863906635 |
| SDF4   | g 78369297 ref NM_001035375.1   | Bos taurus stromal cell derived factor 4 (SDF4), mRNA                                                              | 0.91356942   | 1.290067656 | 0.993519792  | 1.063664958 | 0.976807283 |
| SOD1   | g 31341527 ref NM_174615.2      | Bos taurus superoxide dismutase 1, soluble (SOD1), mRNA                                                            | 1.007005464  | 1.192744458 | 0.969604248  | 1.011573217 | 0.930967125 |
| SOD2   | g 741938633 ref NM_010808730.1  | PREDICTED: Bos taurus superoxide dismutase 2, mitochondrial (SOD2), transcript variant X1, mRNA                    | 1.016365962  | 1.325003048 | 1.023179794  | 0.964304227 | 0.904935343 |
| SOD2   | g 88853815 ref NM_201527.2      | Bos taurus superoxide dismutase 2, mitochondrial (SOD2), mRNA                                                      | 1.069242369  | 1.249862228 | 0.924860132  | 0.928438687 | 0.905395026 |
| SOD2   | g 982988233 ref NM_015464889.1  | PREDICTED: Bos taurus superoxide dismutase 2, mitochondrial (SOD2), transcript variant X2, mRNA                    | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| SQSTM1 | g 110626168 ref NM_176641.1     | Bos taurus sequestosome 1 (SQSTM1), mRNA                                                                           | 0.88881091   | 1.117330269 | 0.915357663  | 1.068129074 | 1.133124429 |
| SQSTM1 | g 982929187 ref NM_010806433.2  | PREDICTED: Bos taurus sequestosome 1 (SQSTM1), transcript variant X1, mRNA                                         | 0.858792803  | 1.130260375 | 0.947475132  | 1.012744386 | 1.093531055 |
| TCPI   | g 84000142 ref NM_001038086.1   | Bos taurus t-complex 1 (TCPI), mRNA                                                                                | 0.994845024  | 1.107880756 | 1.152307229  | 0.969906068 | 1.009080475 |
| TOP1   | g 330417917 ref NM_001206487.1  | Bos taurus topoisomerase (DNA) 1 (TOP1), mRNA                                                                      | 0.769949734  | 1.195854464 | 1.07086656   | 0.997232605 | 0.907979427 |
| TOP2A  | g 741963842 ref NM_010816273.1  | PREDICTED: Bos taurus topoisomerase (DNA) II alpha (TOP2A), transcript variant X3, mRNA                            | 1.047727767  | 0.973349996 | 1.063315782  | 1.506868743 | 1.034233379 |
| TOP2A  | g 982957905 ref NM_005220781.3  | PREDICTED: Bos taurus topoisomerase (DNA) II alpha (TOP2A), transcript variant X1, mRNA                            | 1.109173584  | 1.197284825 | 0.996910386  | 0.965800443 | 0.891698489 |
| TOP2A  | g 982957906 ref NM_015458846.1  | PREDICTED: Bos taurus topoisomerase (DNA) II alpha (TOP2A), transcript variant X2, mRNA                            | 1.067748981  | 1.059893746 | 1.027794514  | 1.067185652 | 0.867469241 |
| TST    | g 402692518 ref NM_177489.3     | Bos taurus thiosulfate sulfurtransferase (rhodanese) (TST), mRNA                                                   | 0.986364185  | 0.9130316   | 1.193687675  | 0.922446281 | 1.081196896 |
| TYRP1  | g 149944623 ref NM_174480.3     | Bos taurus tyrosinase-related protein 1 (TYRP1), mRNA                                                              | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| TYRP1  | g 982933190 ref NM_015472442.1  | PREDICTED: Bos taurus tyrosinase-related protein 1 (TYRP1), transcript variant X1, mRNA                            | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| TYRP1  | g 982933192 ref NM_015472443.1  | PREDICTED: Bos taurus tyrosinase-related protein 1 (TYRP1), transcript variant X2, mRNA                            | n.a.         | n.a.        | n.a.         | n.a.        | n.a.        |
| UBB    | g 31342776 ref NM_174133.2      | Bos taurus ubiquitin B (UBB), mRNA                                                                                 | 0.861145882  | 1.270945105 | 1.05383897   | 0.967213005 | 0.930971918 |
| UNG    | g 402692189 ref NM_001075513.2  | Bos taurus uracil-DNA glycosylase (UNG), mRNA                                                                      | 0.935297125  | 1.186350831 | 1.059739394  | 1.02343935  | 0.781797462 |
| UNG    | g 741956450 ref NM_005217795.2  | PREDICTED: Bos taurus uracil DNA glycosylase (UNG), transcript variant X1, mRNA                                    | 1.03404206   | 1.245195621 | 1.399836885  | 0.662258586 | 0.71748264  |
| VIM    | g 110347569 ref NM_173969.3     | Bos taurus vimentin (VIM), mRNA                                                                                    | 0.162272337  | 0.07494613  | 2.088211331  | 0.675222653 | 0.892752558 |
| XPC    | g 982933710 ref XR_001500856.1  | PREDICTED: Bos taurus xeroderma pigmentosum, complementation group A (XPA), transcript variant X1, misc_RNA        | 0.845196017  | 1.224055511 | 1.0282933136 | 1.021393798 | 0           |