

Supplementary Materials: Genome-Wide Association Study Provides Insights into Important Genes for Reproductive Traits in Nelore Cattle

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Table S1. Estimations of genetic variance (σ_a^2), genetic variance of maternal effect (σ_m^2), genetic standard deviation (σ_a), genetic standard deviation of maternal effect (σ_m), residual variance (σ_e^2), residual standard deviation (σ_e), heritability (h_a^2) and heritability of maternal effect (h_m^2) for scrotal circumference at 365 days of age (SC365), scrotal circumference at 450 days of age (SC450), gestation length (GL), as a calf trait, age at first calving (AFC), accumulated productivity (ACP), early calving until 30 months (HC30) and stayability (STAY).

Parameters	Variance components and heritability estimates						
	SC355	SC450	GL	AFC	ACP	HC30	STAY
σ_a^2	1.2752	2.7342	17.149	3.1291	117.840	1.847	0.4163
σ_m^2	-	-	1.549	-	-	-	-
σ_a	0.10086	0.20396	1.5803	0.347	19.634	0.402	5.567E-02
σ_m	-	-	0.45191	-	-	-	-
σ_e^2	1.9038	2.8895	14.875	16.272	542.710	1.002	1.009
σ_e	7.63E-02	0.1496	0.90241	0.32625	18.649	3.865E-02	1.801E-02
h_a^2	0.401	0.486	0.511	0.161	0.178	0.648	0.292
h_m^2	-	0.046	-	-	-	-	-

Table S2. Genes in significant genomics regions associated with reproductive traits in Nelore cattle.

Trait	
Chromosome: Position(pb)	Gene
Scrotal circumference at 450 days of age	
19:16748888-16777564	ASIC2
26:489143-4913438	UBE2D1, CISD1, IPMK, ZWINT, ENSBTAG00000023971, ENSBTAG00000048299, ENSBTAG00000047692
Gestation length, as a calf trait	
13:75605755-75651541	CDH22
Age at first calving	
11:21246-21281912	ENSBTAG00000038257, ZC3H6, ZC3H8, FBLN7, TMEM87B, ENSBTAG00000044282, RF00401, MERTK, RF00156, ANAPC1, RF00026, ENSBTAG00000023163, BCL2L11, ACOXL, BUB1, TPC3, ENSBTAG00000045538, NPHP1, MALL, MAL, ENSBTAG00000034657, MRPS5, ZNF514, ZNF2, ENSBTAG00000047503, PROM2, ENSBTAG00000017955, FAHD2A, GPAT2, ADRA2B, ASTL, DUSP2, STARD7, TMEM127, CIAO1, SNRNP200, ENSBTAG00000047659, ITPRIPL1, NCAPH, NEURL3, ARID5A, KANSL3, FER1L5, LMAN2L, CNNM4, CNNM3, ANKRD23, ANKRD39, SEMA4C, FAM178B, COX5B, ACTR1B, ZAP70, TMEM131, VWA3B, CNGA3, INPP4A, COA5, UNC50, MGAT4A, RF00425, TSGA10, C2orf15, LIPT1, MITD1, MRPL30, LYG2, TXNDC9, EIF5B, REV1, ENSBTAG00000012449, LONRF2, CHST10, NMS, PDCL3, PTPN13, ENSBTAG00000016794, NPAS2, RPL31, TBC1D8, CNOT11, RF00578, RNF149, CREG2, RFX8, MAP4K4, IL1R2, RF00594, IL1R1, RF00001, ENSBTAG00000046579, IL1RL2, IL1RL1, IL18R1, IL18RAP, SLC9A4, SLC9A2, MFSD9, TMEM182, MRPS9, GPR45, TGFBRAP1, C11H2orf49, FHL2, TACR1, POLE4, HK2, ENSBTAG00000044983, SEMA4F, M1AP, DOK1, LOXL3, HTRA2, AUP1, DQX1, TLX2, PCGF1, LBX2, CCDC142,

MRPL53, MOGS, WBP1, INO80B, RTKN, WDR54, C11H2orf81, MGC152281, DCTN1, SLC4A5, ENSBTAG00000010072, MTHFD2, MOB1A, BOLA3, TET3, DGUOK, ACTG2, STAMBP, C2orf78, DUSP11, bta-mir-2295, TPRKB, NAT8, ALMS1, EGR4, FBXO41, CCT7, PRADC1, SMYD5, NOTO, ENSBTAG00000008035, RF00100, RAB11FIP5, bta-mir-2294, SFXN5, EMX1, SPR, EXOC6B, ENSBTAG00000046679, ENSBTAG00000039263, CYP26B1, DYSF, ZNF638, PAIP2B, NAGK, TEX261, ANKRD53, ATP6V1B1, VAX2, CD207, CLEC4F, FIGLA, ADD2, TGFA, FAM136A, XDH, SRD5A2, MEMO1, ENSBTAG00000033887, DPY30, SPAST, SLC30A6, NLRC4, YIPF4, BIRC6, TTC27, ENSBTAG00000037357, LTBP1, RASGRP3, ENSBTAG00000045057, FAM98A, RF00066, RF00015, CRIM1, FEZ2, VIT, STRN, HEATR5B, GPATCH11, EIF2AK2, SULT6B1, CEBPZ, NDUFAF7, PRKD3, QPCT, CDC42EP3, RMDN2, CYP1B1, ATL2, RF01161, HNRNPLL, ENSBTAG00000044545, ENSBTAG00000026809, GALM, SRSF7, ENSBTAG00000012984, GEMIN6, DHX57, MORN2, ARHGEF33

11:21287816-21311113

ARHGEF33

Accumulated productivity

1:2054452-20570066

PAXB1, SYNJ1, SYNJ1, CFAP298, EVA1C, URB1, MRAP, MIS18A, HUNK, SCAF4, SOD1, TIAM1, TIAM1, bta-mir-2284i, bta-mir-2284x, ENSBTAG00000004530, KRTAP11-1, KRTAP7-1, KRTAP8-1, ENSBTAG00000044154, RF00026, KRTAP13-1, ENSBTAG00000037933, KRTAP27-1, KRTAP24-1, CLDN8, CLDN17, ENSBTAG00000030124, GRIK1, GRIK1, ENSBTAG00000045873, RF00026, BACH1, MAP3K7CL, CCT8, USP16, RWDD2B, RWDD2B, LTN1, ENSBTAG00000038433, N6AMT1, RF00026, ENSBTAG00000040155, RF00432, ADAMTS5, ADAMTS1, RF00026, ENSBTAG00000005742, RF00026, APP, RF00026, GABPA, ATP5PF, ATP5PF, JAM2, MRPL39, bta-mir-155, RF00026, RF00026, ENSBTAG00000038900, ENSBTAG00000048165, RF00100, NCAM2, RF00001, ENSBTAG00000039704, RF00026, RF00001, RF00001, TMPRSS15, TMPRSS15, CHODL, C1H21orf91, RF00026, ENSBTAG00000047943, BTG3, CXADR, RF00100, ENSBTAG00000040418, bta-mir-125b-2, MIRLET7C, bta-mir-99a, ENSBTAG00000047183, RF00026

3:7752656-7785494

ATF6

6:1442287-14434633

MARCH1, TMA16, TKTL2, NPY5R, NPY1R, NAF1, RF00026, BBS7, CCNA2, EXOSC9, ANXA5, RF00012, RF00026, QRFPR, NDNF, PRDM5, RF00026, RF00001, ENSBTAG00000037426, ENSBTAG00000047900, ENSBTAG00000024874, ENSBTAG00000035129, ENSBTAG00000035129, MAD2L1, ENSBTAG00000035764, ENSBTAG00000035764, ENSBTAG00000040228, ENSBTAG00000037311, PDE5A, FABP2, C6H4orf3, USP53, RF00001, MYOZ2, SYNPO2, SEC24D, METTL14, PRSS12, RF00399, ENSBTAG00000010010, NDST3, NDST3, ENSBTAG00000034844, RF00001, RF00001, RF00001, RF00001, RF00001, RF00001, RF00001, ENSBTAG00000034849, TRAM1L1, ENSBTAG00000000119, ENSBTAG00000009280, NDST4, UGT8, ENSBTAG00000011299, ARSJ, CAMK2D, CAMK2D, ENSBTAG00000002392, ENSBTAG00000002392, ENSBTAG00000002392, LARP7, bta-mir-302b, bta-mir-302c, bta-mir-302a, bta-mir-302d, bta-mir-367, ENSBTAG00000026936, ENSBTAG00000013198, NEUROG2, ALPK1, ALPK1, ALPK1, TIFA, AP1AR

6:94344402-94375956

MRPL1

6:94388672-94426934

MRPL1

16:1706924-17085278

SOX13, ETNK2, REN, KISS1, GOLT1A, PLEKHA6, PLEKHA6, PLEKHA6, PPP1R15B, PIK3C2B, PIK3C2B, RF00334, MDM4, ENSBTAG00000026068, ENSBTAG00000034611, LRRN2, RF01169, NFASC, CNTN2, TMEM81, RBBP5, DSTYK, TMCC2, TMCC2, NUAKE2, ENSBTAG00000047727, KLHDC8A, LEMD1, bta-mir-135b, CDK18, MFSD4A, ELK4, ELK4, SLC45A3, NUCKS1, RAB29, SLC41A1, PM20D1, SLC26A9, RAB7B, RHEX, AVPR1B, FAM72A, SRGAP2, IKBKE, RASSF5, EIF2D, DYRK3, MAPKAPK2, IL10, IL19, IL19, IL20, PIGR, PIGR, PIGR, FCAMR, FCMR, IL24, ENSBTAG00000046946, C16H1orf116, YOD1, PFKFB2, PFKFB2, C4BPB, C4BPA, C4BPA, ENSBTAG00000039196, ENSBTAG00000047621, CD55, CD55, CD55, ENSBTAG00000045783, CR2, CR2, ENSBTAG00000023177, ENSBTAG00000024647, ENSBTAG00000047228, ENSBTAG00000040409, CFH, ENSBTAG00000047966, KCNT2, ENSBTAG00000044933, ENSBTAG00000025113, ENSBTAG00000020953, RF00019, ENSBTAG00000014862, RF00004, ENSBTAG00000012765, CDC73, ENSBTAG00000047703, ENSBTAG00000046060, B3GALT2, GLRX2, TROVE2,

UCHL5, ENSBTAG00000044446, RGS2, RGS13, RGS1, RGS21, RGS18, RF00001, RF00156, BRINP3, ENSBTAG00000045416, RF00001, RF00026

Heifer early calving until 30 months

11:11320434-11348287

RAB11FIP5

11:11355768-11368368

RAB11FIP5, SFXN5

11:11374317-11381414

SFXN5

11:11410105-11424583

SFXN5

11:11439886-11463529

SFXN5

11:11496633-11536209

EMX1

11:67791729-67805289

ENSBTAG00000047822

13:64212843-64261331

RF00045, ASIP, AHCY

13:6426382-64340236

SPTLC3, RF00273, ISM1, TASP1, TASP1, ESF1, NDUFAF5, SEL1L2, FLRT3, MACROD2, KIF16B, ENSBTAG00000032609, SNRPB2, OTOR, NANP, ENSBTAG00000023169, ENSBTAG00000004354, ENSBTAG00000022922, ENSBTAG00000022922, ENSBTAG00000040046, CCDC3, CAMK1D, RF00619, CDC123, NUDT5, SEC61A2, DHTKD1, UPF2, RF00012, PROSER2, ECHDC3, USP6NL, CELF2, RF00026, ENSBTAG00000045874, ENSBTAG00000048047, ENSBTAG00000048047, GATA3, TAF3, ATP5F1C, KIN, ITIH2, ENSBTAG00000037516, ITIH5, SFMBT2, RF00026, RF00026, PRKCQ, PFKFB3, RBM17, IL2RA, IL2RA, ENSBTAG00000006078, FBH1, ENSBTAG00000036222, ENSBTAG00000036222, ENSBTAG00000017012, ENSBTAG00000022931, ENSBTAG00000022931, ENSBTAG00000034145, ANKRD26, YME1L1, MASTL, ACBD5, ACBD5, ABI1, PDSS1, APBB1IP, CCNY, CREM, CREM, CUL2, PARD3, NRP1, ITGB1, ITGB1, CCDC7, ARL5B, ENSBTAG00000047430, ENSBTAG00000037969, MALRD1, ENSBTAG00000044751, RF00026, PLXDC2, NEBL, ENSBTAG00000003937, SKIDA1, MLLT10, DNAJC1, DNAJC1, ENSBTAG00000044566, ENSBTAG00000025968, BMI1, SPAG6, COMMD3, PIP4K2A, RF00020, RF00026, RF00019, ARMC3, ARMC3, MSRB2, PTF1A, ENSBTAG00000044137, ENSBTAG00000044137, OTUD1, RF00100, RF00425, ENSBTAG00000040232, KIAA1217, ARHGAP21, ENSBTAG00000044011, ENKUR, RF00026, THNSL1, GPR158, MYO3A, GAD2, GJD4, FZD8, ENSBTAG00000047440, ENSBTAG00000044876, RF00619, OPTN, MCM10, ENSBTAG00000047869, PHYH, SEPHS1, BEND7, PRPF18, FRMD4A, FAM107B, CDNF, HSPA14, ENSBTAG00000045609, RF00099, SUV39H2, DCLRE1C, MEIG1, OLAH, ACBD7, RPP38, NMT2, NMT2, FAM171A1, RF00026, ITGA8, MINDY3, PTER, C1QL3, RSU1, CUBN, TRDMT1, VIM, ST8SIA6, HACD1, STAM, RF00153, TMEM236, MRC1, SLC39A12, CACNB2, NSUN6, EPC1, ENSBTAG00000043839, KIF5B, RF00026, ARHGAP12, ZEB1, RF01233, ZNF438, ENSBTAG00000027444, ENSBTAG00000027444, ENSBTAG00000027444, ENSBTAG00000046981, ENSBTAG00000046352, JCAD, MTPAP, MAP3K8, LYZL1, BAMBI, WAC, MPP7, ARMC4, MKX, RAB18, ENSBTAG00000048079, PCSK2, PCSK2, ENSBTAG00000006043, BFSP1, DSTN, RRBP1, BANF2, SNX5, RF00567, MGME1, OVOL2, OVOL2, KAT14, ZNF133, ZNF133, DZANK1, POLR3F, RBBP9, SEC23B, DTD1, ENSBTAG00000012276, RF00001, SCP2D1, SLC24A3, ENSBTAG00000032893, RIN2, bta-mir-2305, NAA20, CRNKL1, CFAP61, INSM1, RALGAPA2, RF00156, KIZ, XRN2, NKX2-4, NKX2-2, ENSBTAG00000035643, PAX1, FOXA2, RF00026, THBD, CD93, NXT1, GZF1, NAPB, CSTL1, CST11, CST11, CST11, MGC133636, ENSBTAG00000027420, CST8, CST8, ENSBTAG00000015949, ENSBTAG00000047137, ENSBTAG00000032687, CST3, SYNDIG1, CST7, CST7, APMAP, ENTPD6, ACSS1, VSX1, PYGB, ABHD12, ANKRD16, ENSBTAG00000035572, ENSBTAG00000002446, GDI2, FAM208B, RF00322, ASB13, ENSBTAG00000027416, CALML5, NET1, UCN3, TUBAL3, TUBAL3, ENSBTAG00000037509, ENSBTAG00000039722, ENSBTAG00000039643, ENSBTAG00000017938, ENSBTAG00000027419, AKR1C3, AKR1C4, AKR1C4, ENSBTAG00000039289, ENSBTAG00000021368,

ENSBTAG00000022570, 20ALPHA-HSD, AKR1E2, ENSBTAG00000017191, KLF6, ENSBTAG00000046128, PITRM1, PFKP, RF00402, ADARB2, ENSBTAG00000039356, ENSBTAG00000039356, ENSBTAG00000039356, ENSBTAG00000037833, WDR37, IDI1, GTPBP4, RF00026, LARP4B, DIP2C, RF00026, RF00089, ZMYND11, ZMYND11, PRNP, PRND, RASSF2, RF00026, SLC23A2, TMEM230, PCNA, CDS2, RF00377, ENSBTAG00000020668, PROKR2, GPCPD1, SHLD1, CHGB, TRMT6, MCM8, CRLS1, LRRN4, FERMT1, ENSBTAG00000046562, BMP2, ENSBTAG00000048291, ENSBTAG00000045753, ENSBTAG00000046276, ENSBTAG00000046776, ENSBTAG00000047638, ENSBTAG00000047320, ENSBTAG00000047962, ENSBTAG00000048089, ENSBTAG00000047653, ENSBTAG00000047102, ENSBTAG00000046716, ENSBTAG00000045555, ENSBTAG00000046631, ENSBTAG00000007199, HAO1, HAO1, ENSBTAG00000032156, ADRA1D, SMOX, RNF24, PANK2, bta-mir-103-2, MAVS, AP5S1, CDC25B, CENPB, SPEF1, C13H20orf27, HSPA12B, ENSBTAG00000027412, SIGLEC1, ADAM33, GFRA4, GFRA4, ATRN, C13H20orf194, C13H20orf194, C13H20orf194, SLC4A11, ITPA, DDRGK1, LZTS3, UBOX5, AVP, OXT, MRPS26, PTPRA, VPS16, PCED1A, TMEM239, C13H20orf141, CPXM1, CPXM1, EBF4, IDH3B, IDH3B, NOP56, RF00274, RF00275, RF00594, RF00432, RF00610, TMC2, SNRPB, RF00570, TGM6, TGM3, ENSBTAG00000022534, RF00156, STK35, PDYN, SIRPA, SIRPA, ENSBTAG00000048087, ENSBTAG00000039016, ENSBTAG00000039016, SIRPB1, SIRPB1, ENSBTAG00000011638, ENSBTAG00000027221, GINS1, PCMTD2, MYT1, NPBWR2, OPRL1, LKAAEAR1, RGS19, TCEA2, SOX18, PRPF6, RF00026, SAMD10, ZNF512B, ZNF512B, UCKL1, bta-mir-1388, DNAJC5, DNAJC5, TPD52L2, TPD52L2, ABHD16B, ZBTB46, SLC2A4RG, ENSBTAG00000007501, ZGPAT, ZGPAT, ARFRP1, TNFRSF6B, ENSBTAG00000047150, ENSBTAG00000047150, ENSBTAG00000047150, RTEL1, STMN3, GMEB2, FNDC11, SRMS, PTK6, PPDPF, EEF1A2, KCNQ2, KCNQ2, ENSBTAG00000031764, CHRNA4, COL20A1, COL20A1, COL20A1, ARFGAP1, ARFGAP1, BIRC7, BIRC7, YTHDF1, bta-mir-124b, RF00635, BHLHE23, SLC17A9, GID8, DIDO1, ENSBTAG00000046520, COL9A3, OGFR, MRGBP, NTSR1, SLCO4A1, bta-mir-133a-1, bta-mir-1-1, GATA5, RBBP8NL, CABLES2, RPS21, bta-mir-2306, LAMA5, ADRM1, ADRM1, OSBPL2, OSBPL2, OSBPL2, PSMA7, ENSBTAG00000021558, HRH3, MTG2, SS18L1, TAF4, TAF4, CDH4, CDH26, FAM217B, PPP1R3D, SYCP2, PHACTR3, EDN3, ZNF831, PRELID3B, ATP5F1E, TUBB1, CTSZ, NELFCD, GNAS, GNAS, GNAS, GNAS, bta-mir-296, NPEPL1, ENSBTAG00000003872, ENSBTAG00000038838, APCDD1L, VAPB, RAB22A, ANKRD60, C13H20orf85, PMEPA1, ZBP1, ZBP1, ZBP1, PCK1, CTCFL, RBM38, RAE1, SPO11, ENSBTAG00000047773, BMP7, bta-mir-2307, ENSBTAG00000037492, TFAP2C, ENSBTAG00000024608, FAM209A, RTF2, GCNT7, CASS4, RF00001, CSTF1, AURKA, FAM210B, MC3R, SIRPD, ENSBTAG00000006539, NSFL1C, FKBP1A, SDCBP2, SNPH, RAD21L1, TMEM74B, PSMF1, RSPO4, ANGPT4, FAM110A, SLC52A3, SRXN1, TCF15, CSNK2A1, TBC1D20, RBCK1, TRIB3, NRSN2, ENSBTAG00000027386, ZCCHC3, C13H20orf96, DEFB129, ENSBTAG00000048009, DEFB119, DEFB119, DEFB122A, DEFB122, DEFB123, DEFB124, REM1, HM13, ID1, COX4I2, BCL2L1, TPX2, MYLK2, FOXS1, ENSBTAG00000031214, DUSP15, TTLL9, PDRG1, XKR7, CCM2L, HCK, HCK, TM9SF4, PLAGL2, POFUT1, POFUT1, POFUT1, POFUT1, KIF3B, ASXL1, NOL4L, NOL4L, COMMD7, DNMT3B, MAPRE1, SUN5, RF00026, BPIFB2, BPIFB6, BPIFB6, BPIFB6, BPIFB3, BPIFB4, ENSBTAG00000038453, BPIFA2A, BPIFA2C, ENSBTAG00000031375, ENSBTAG00000011704, BPIFA2B, ENSBTAG00000031373, BPIFA3, BPIFA3, BPIFA1, BPIFB1, BPIFB5, ENSBTAG00000031354, CDK5RAP1, SNTA1, ENSBTAG00000014869, CBFA2T2, NECAB3, C13H20orf144, C13H20orf144, ACTL10, E2F1, PXMP4, ZNF341, ZNF341, CHMP4B, RALY, EIF2S2, RF00045, ASIP, AHCY

13:64358933-64432139

ITCH, ENSBTAG00000046623

13:64450162-64500844

ITCH, DYNLRB1, MAP1LC3A, PIGU

25:18619922-18639119

ACSM3

25:18672747-18714923

REXO5

25:18946238-18966876

DNAH3

Stayability

1:33285504-33305018

CADM2

3:43009131-43028743

CDC14A

4:55984897-56013042

ZNF277

11:1424088-1433201

ACOXL

13:1339928-13434427

PLCB1, PLCB4, LAMP5, PAK5, ENSBTAG00000046074, RF00408, MRPL33, ANKEF1, SNAP25, MKKS, RF00026, SLX4IP, JAG1, SRY, BTBD3, RF00156, ENSBTAG00000045631, SPTLC3, RF00273, ISM1, TASP1, TASP1, ESF1, NDUFAF5, SEL1L2, FLRT3, MACROD2, KIF16B, ENSBTAG00000032609, SNRNP2, OTOR, NANP, ENSBTAG00000023169, ENSBTAG00000004354, ENSBTAG00000022922, ENSBTAG00000022922, ENSBTAG00000040046, CCDC3, CAMK1D, RF00619, CDC123, NUDT5, SEC61A2, DHTKD1, UPF2, RF00012, PROSER2, ECHDC3, USP6NL, CELF2

Table S3. Enriched GO terms and KEGG pathways significantly enriched (≤ 0.05) from DAVID software for age at first calving.

Age at first calving				
Category	Term	Genes	p-Value	GO Term
Biological Process	mitochondrial translational elongation	4	3,6E-2	GO:0070125
	mitochondrial translational initiation	4	3,6E-2	GO:0070124
	regulation of intracellular pH	3	3,9E-2	GO:0051453
Cell Component	spindle pole	4	3,6E-2	GO:0000922
Molecular Function	interleukin-1, Type I, activating receptor activity	2	1,9E-2	GO:0004909
	interleukin-1 receptor activity	2	2,8E-2	GO:0004908

Table S4. Enriched GO terms and KEGG pathways significantly enriched (≤ 0.05) from DAVID software for accumulated productivity.

Accumulated productivity				
Category	Term	Genes	p-Value	GO Term
Biological Process	positive regulation of JAK-STAT cascade	4	1,1E-4	GO:0046427
	response to organic substance	3	1,1E-3	GO:0010033
	response to hydrogen peroxide	3	7,8E-3	GO:0042542
	regulation of multicellular organism growth	3	1,2E-2	GO:0040014
	negative regulation of complement activation, classical pathway	2	1,5E-2	GO:0045959
	protein phosphorylation	5	1,9E-2	GO:0006468
	protein localization to paranode region of axon	2	2,9E-2	GO:0002175
	metabolic process	4	3,1E-2	GO:0008152
	relaxation of cardiac muscle	2	3,7E-2	GO:0055119
	relaxation of vascular smooth muscle	2	4,4E-2	GO:0060087
Cell Component	paranodal junction assembly	2	4,4E-2	GO:0030913
	other organism cell	2	1,5E-2	GO:0044216
	basolateral plasma membrane	4	3,9E-2	GO:0016323
Molecular function	cytosol	14	4,3E-2	GO:0005829
	heparin binding	5	8,2E-3	GO:0008201
	GTPase activator activity	6	1,2E-2	GO:0005096
	pancreatic polypeptide receptor activity	2	2,2E-2	GO:0001602
	[heparan sulfate-glucosamine N-sulfotransferase activity	2	3,0E-2	GO:0015016
Pathway	peptide YY receptor activity	2	3,0E-2	GO:0001601
	Complement and coagulation cascades	5	2,9E-3	-
	Cell adhesion molecules (CAMs)	6	7,7E-3	-

MicroRNAs in cancer

6

4,8E-2

-

Table S5. Enriched GO terms and KEGG pathways significantly enriched (≤ 0.05) from DAVID software for heifer early calving until 30 months.

Heifer early calving until 30 months				
Category	Term	Genes	p-Value	GO Term
Biological Process	negative regulation of cysteine-type endopeptidase activity	9	1,3E-11	GO:2000117
	innate immune response	15	9,6E-4	GO:0045087
	fatty acid alpha-oxidation	3	7,8E-3	GO:0001561
	defense response to bacterium	7	1,2E-2	GO:0042742
	negative regulation of transcription, DNA-templated	13	1,8E-2	GO:0045892
	negative regulation of sequence-specific DNA binding	5	1,9E-2	GO:0043433
	transcription factor activity	3	2,6E-2	GO:1990138
	neuron projection extension	3	3,6E-2	GO:0030705
	cytoskeleton-dependent intracellular transport	5	4,0E-2	GO:0007018
	microtubule-based movement	4	4,5E-2	GO:0045599
Cell Component	negative regulation of fat cell differentiation	2	4,6E-2	GO:1902305
	regulation of sodium ion transmembrane transport	16	7,7E-3	GO:0009986
	cell surface	20	1,9E-2	GO:0005576
	extracellular region	9	2,1E-2	GO:0005874
	microtubule	5	3,4E-2	GO:0031234
Molecular Function	extrinsic component of cytoplasmic side of plasma membrane	10	7,5E-9	GO:0004869
	cysteine-type endopeptidase inhibitor activity	10	3,0E-8	GO:0002020
	protease binding	14	6,8E-8	GO:0008289
	lipid binding	12	5,5E-5	GO:0016491
	oxidoreductase activity	2	4,7E-2	GO:0005185
	neurohypophyseal hormone activity	2	4,7E-2	GO:0048244
Pathway	phytanoyl-CoA dioxygenase activity	7	3,0E-3	-
	ribosome biogenesis in eukaryotes			

Table S6. Enriched GO terms and KEGG pathways significantly enriched (≤ 0.05) from DAVID software for stayability.

Stayability				
Category	Term	Genes	p-Value	GO Term
Biological Process	cerebral cortex development	3	2,1E-3	GO:0021987
Molecular Function	phosphatidylinositol phospholipase C activity	2	2,8E-2	GO:0004435
Pathway	Aldosterone synthesis and secretion	3	9,0E-3	-
	Insulin secretion	3	9,7E-3	-
	Sphingolipid signaling pathway	3	2,0E-2	-
	Oxytocin signaling pathway	3	3,1E-2	-

Table S7. Common gene list associated with de with reproductive traits in Nelore cattle.

Traits	Total Common Genes
AFC and STAY: 1	ACOXL
AFC and HC30: 3	RAB11FIP5, SFXN5, EMX1
HC30 and STAY: 31	SPTLC3, RF00273, ISM1, TASP1, ESF1, NDUFAF5, SEL1L2, FLRT3, MACROD2, KIF16B, ENSBTAG00000032609, SNRNPB2, OTOR, NANP, ENSBTAG00000023169, ENSBTAG00000004354, ENSBTAG00000022922, ENSBTAG00000040046, CCDC3, CAMK1D, RF00619, CDC123, NUDT5, SEC61A2, DHTKD1, UPF2, RF00012, PROSER2, ECHDC3, USP6NL, CELF2