

Supplementary Figures

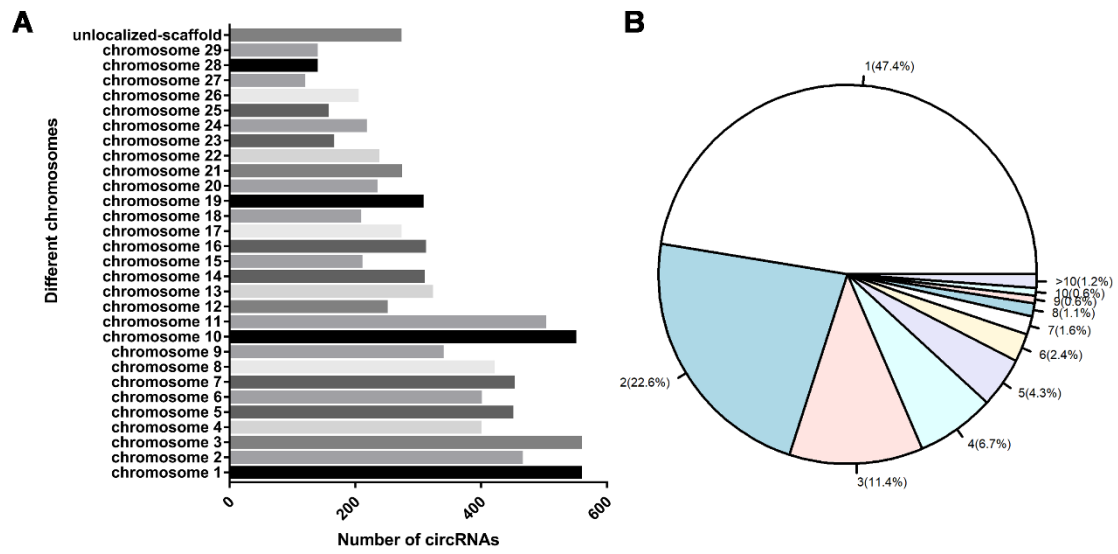


Figure S1. Analysis of the position of circRNAs in the chromosome and the number of circRNAs produced by each gene. **(A)** The number of circRNAs in the chromosome; **(B)** The number of circRNAs produced by each gene.

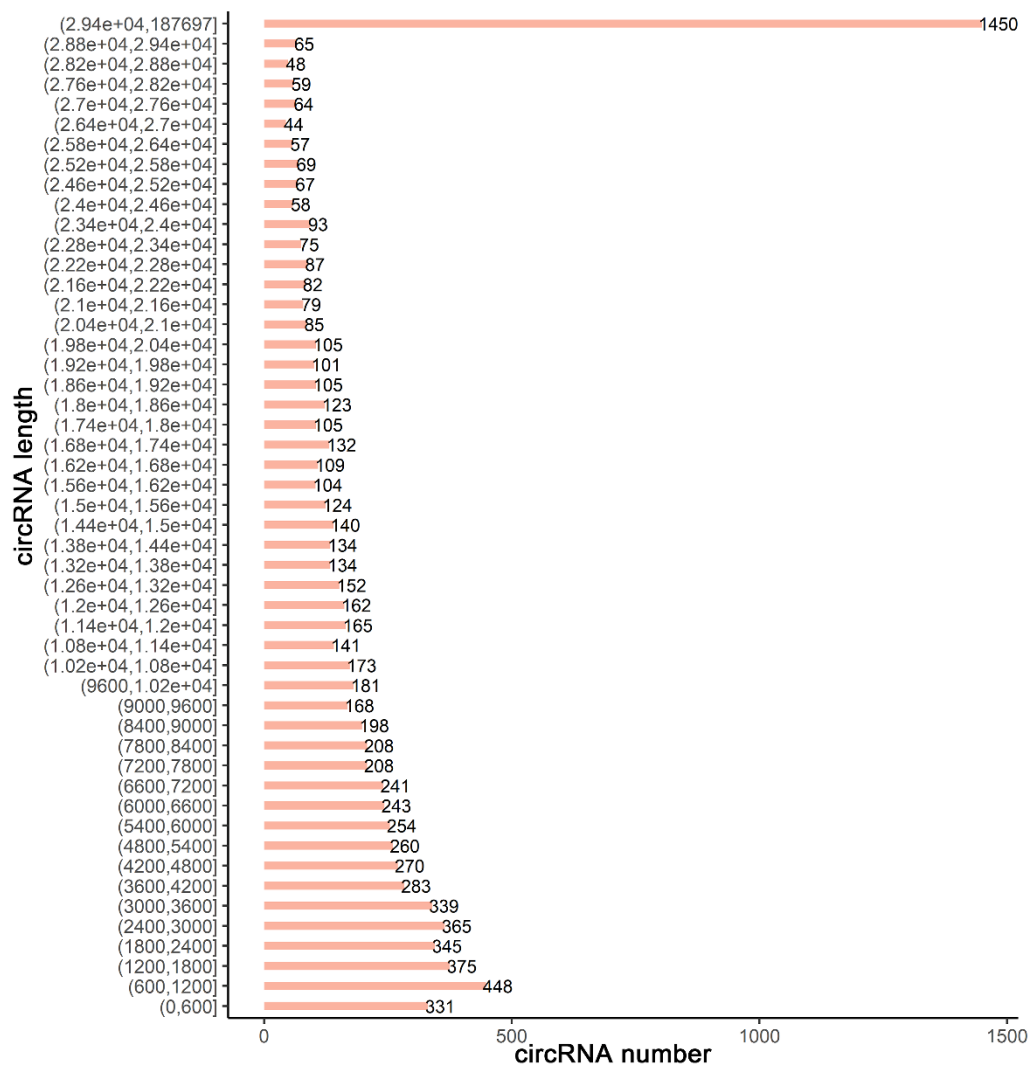


Figure S2. Length distribution of circRNAs.

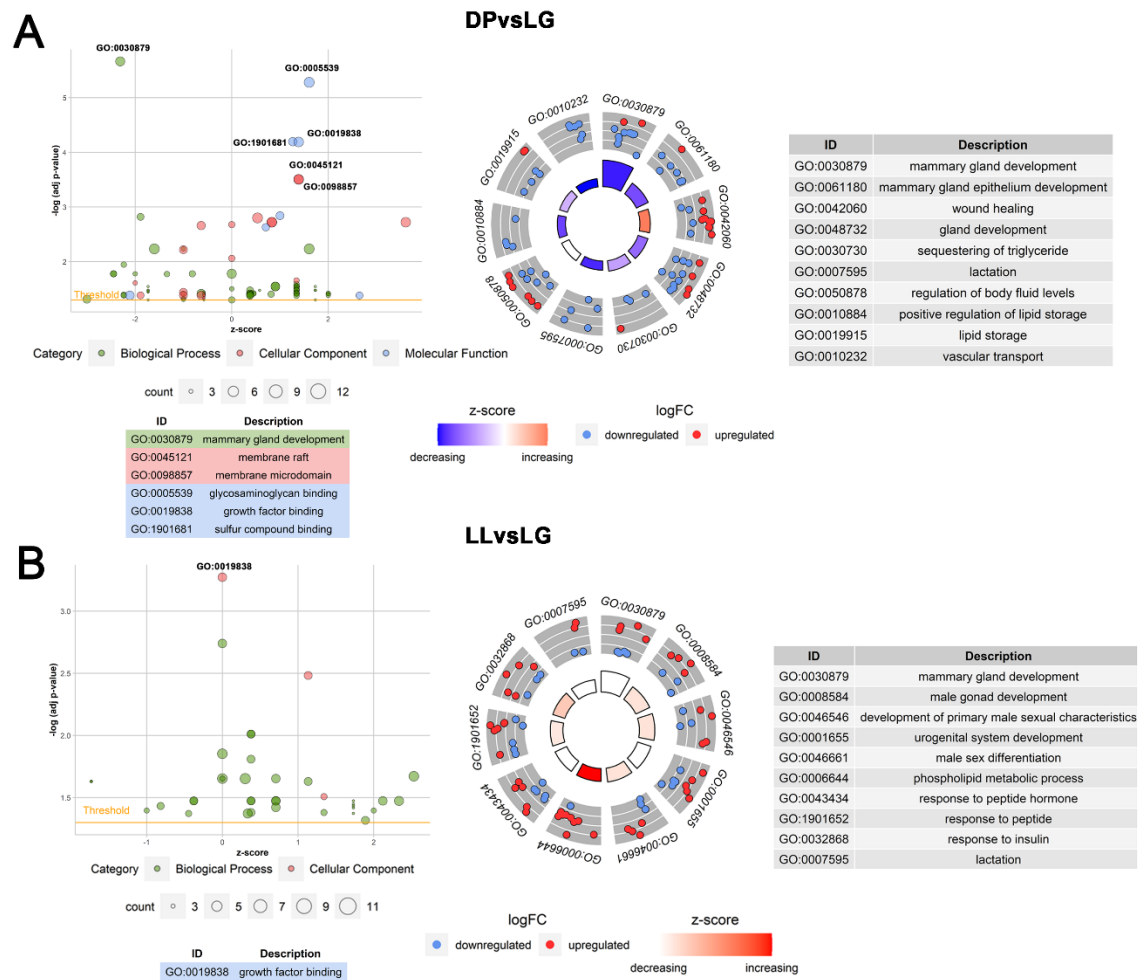


Figure S3. GO functions annotation analysis of up-regulated and down-regulated circRNAs source genes in DP vs. LG and LL vs. LG. LL: late lactation, DP: dry period, and LG: late gestation.

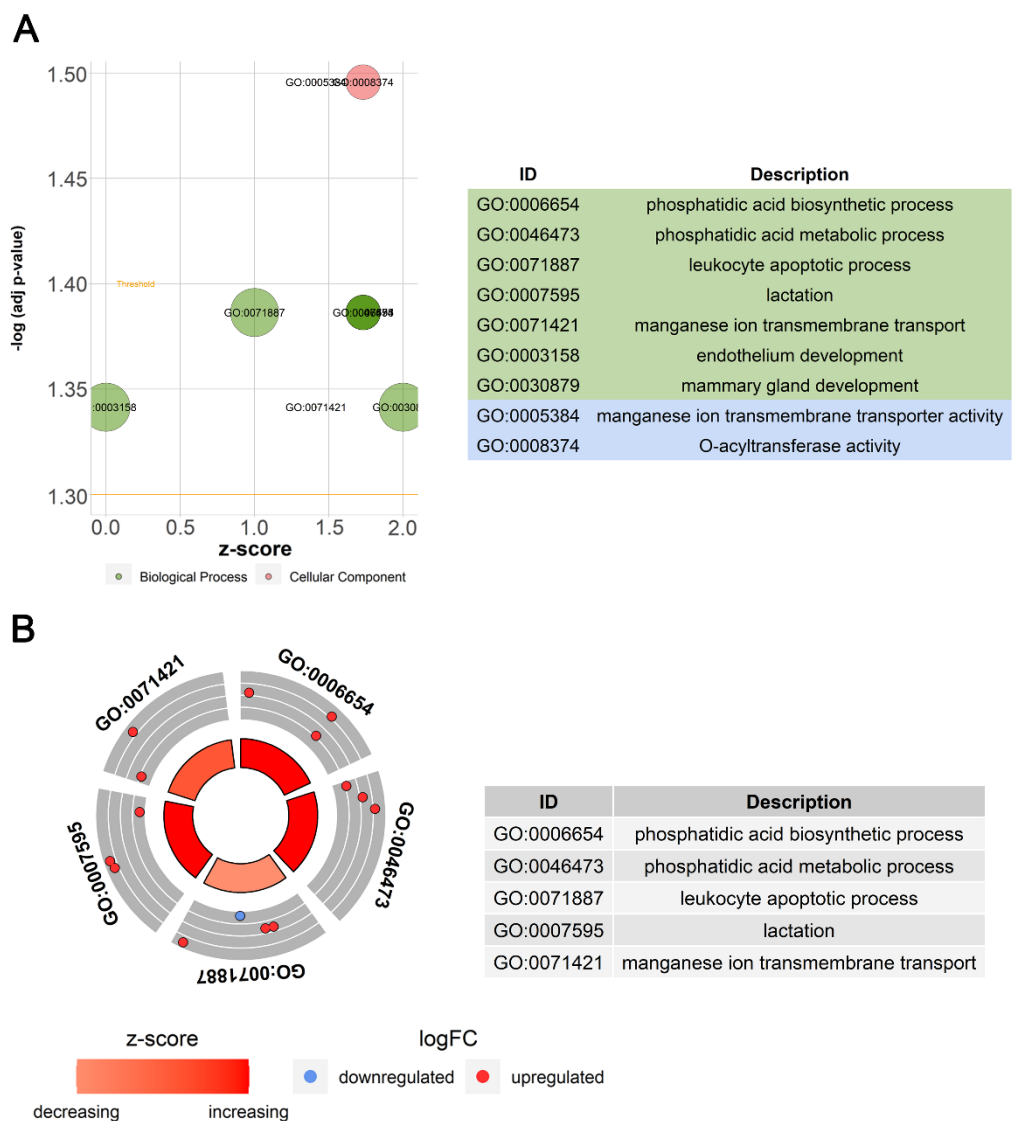


Figure S4. GO functions annotation analysis on the up/down-regulated genes targeting the differentially expressed circRNAs in LL vs. DP. LL: late lactation, DP: dry period.

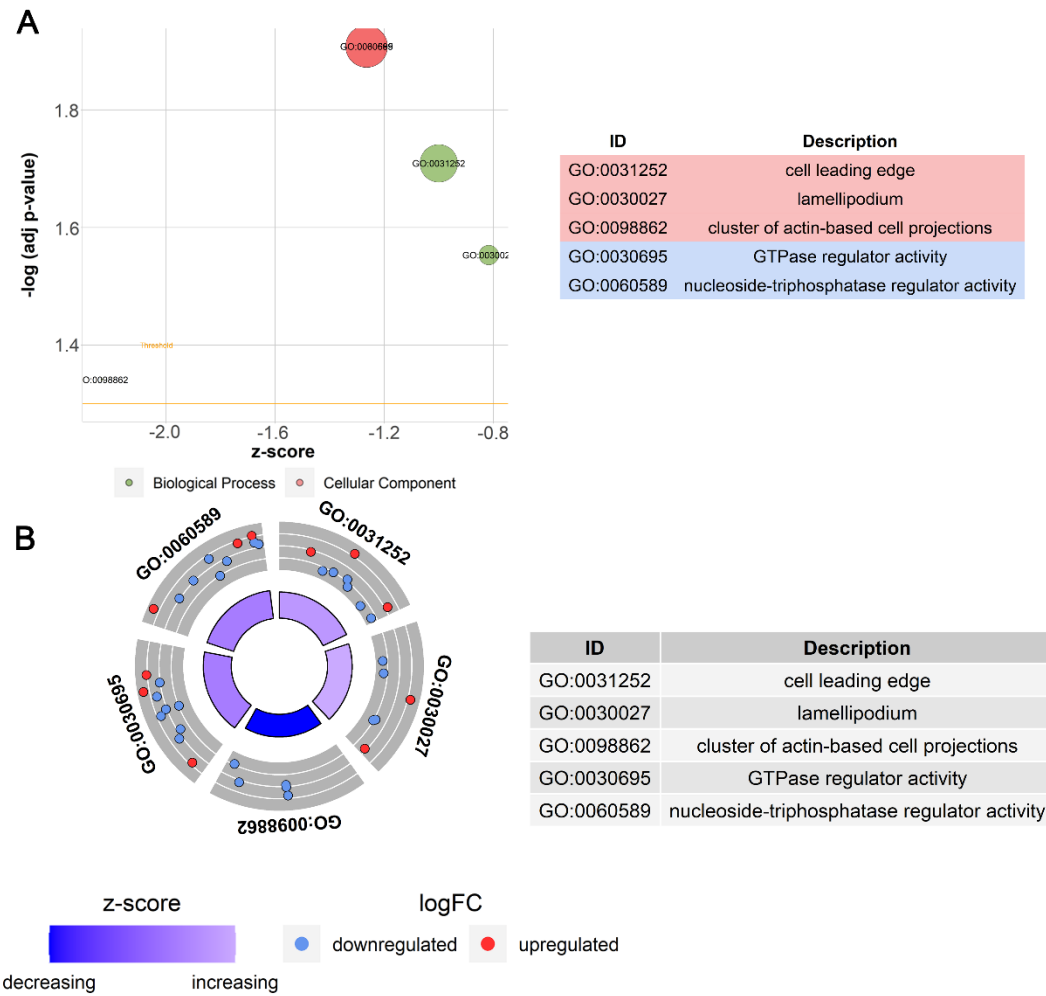


Figure S5. GO functions annotation analysis on the up/down-regulated genes targeting the differentially expressed circRNAs in DP vs. LG. LG: late gestation, DP: dry period.

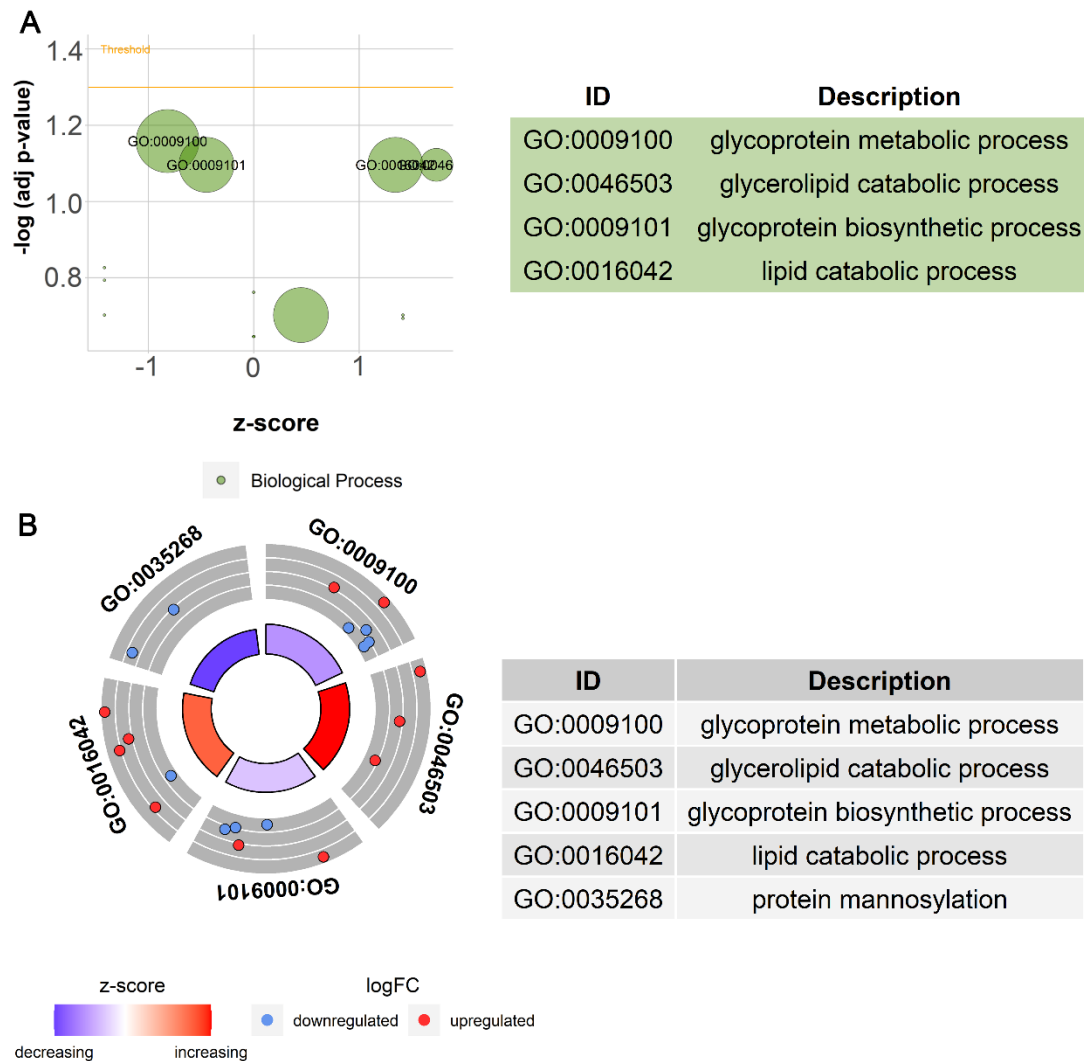


Figure S6. GO functions annotation analysis on the up/down-regulated genes targeting the differentially expressed circRNAs in LL vs. LG. LL: late lactation, LG: late gestation.

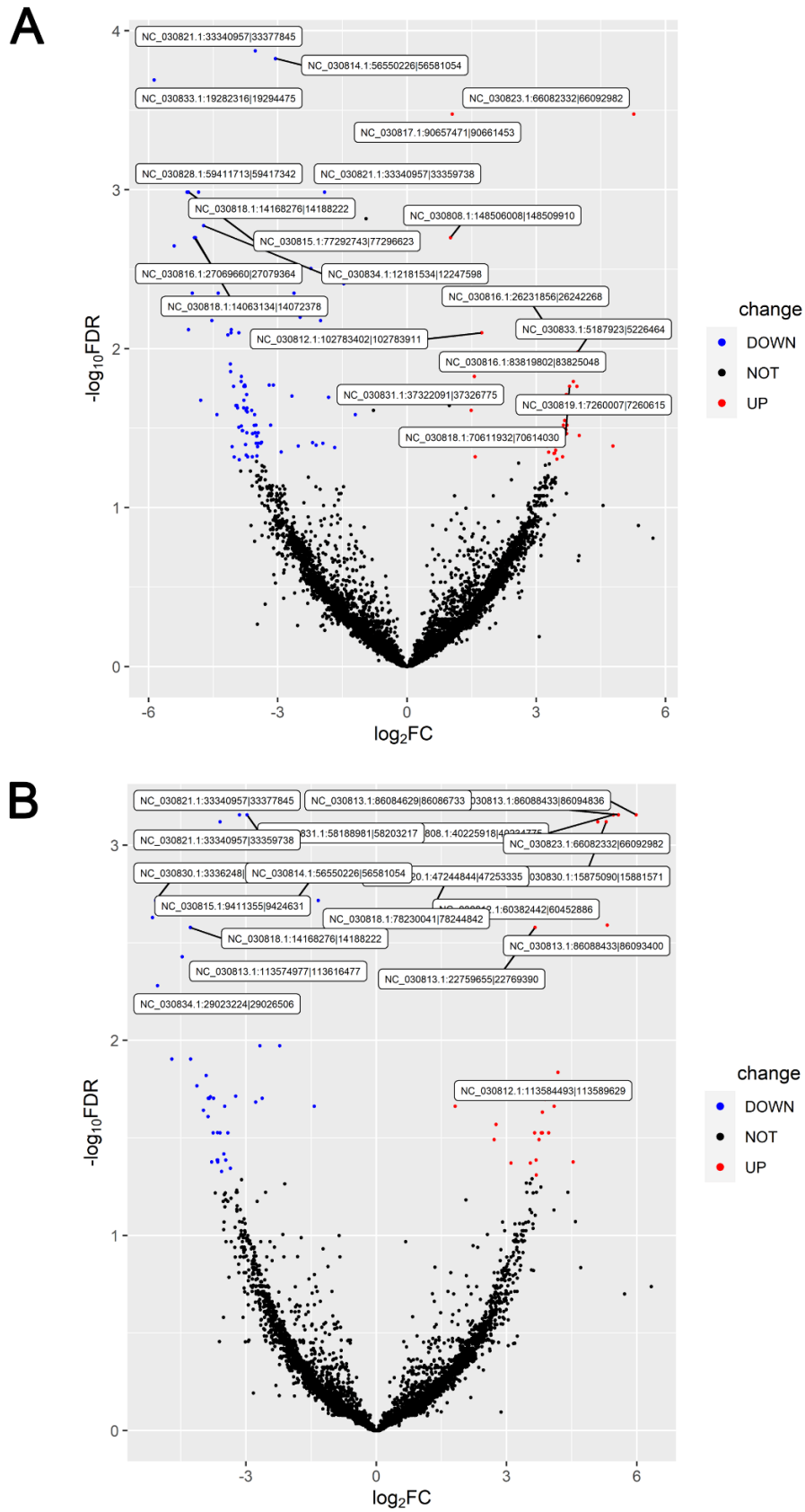


Figure S7. Volcano maps of differentially expressed circRNAs in DP vs. LG and LL vs. LG. (A) and (B) respectively refer to DP vs. LG and LL vs. LG. LL: late lactation, DP: dry period, and LG: late gestation.

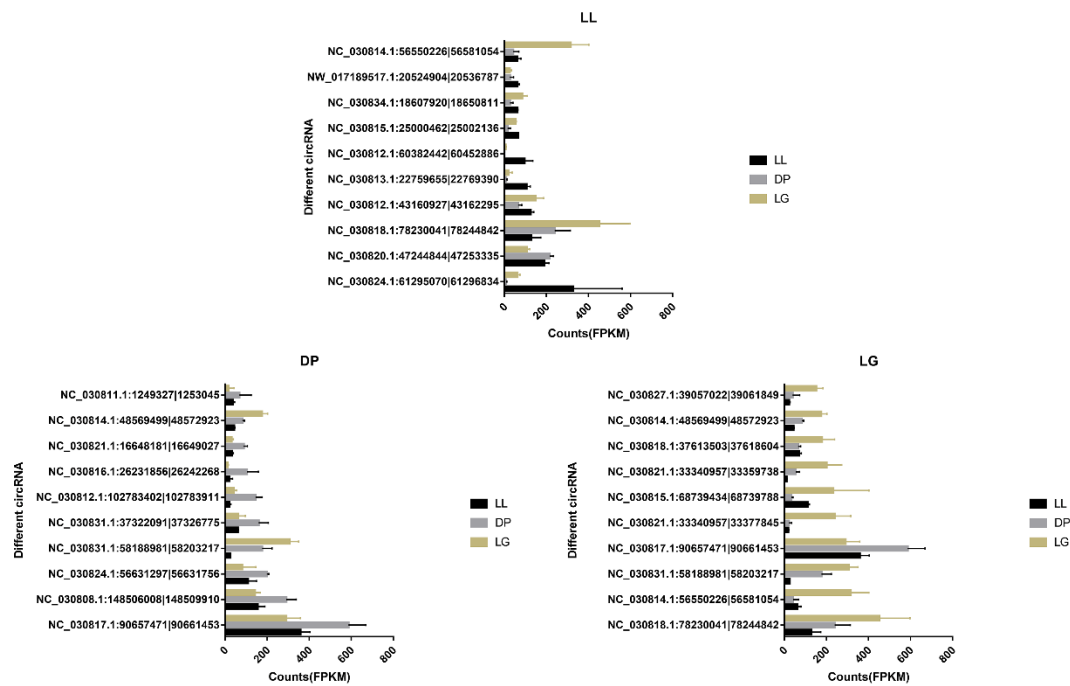


Figure S8. Expression histogram of differentially expressed circRNAs at different stages of mammary gland development. The differentially expressed circRNAs were sorted according to the expression level at each developmental stage, and the top 10 differentially expressed circRNAs at each developmental stage (LL, DP, and LG) were selected and displayed using a histogram. LL: late lactation, DP: dry period, and LG: late gestation.

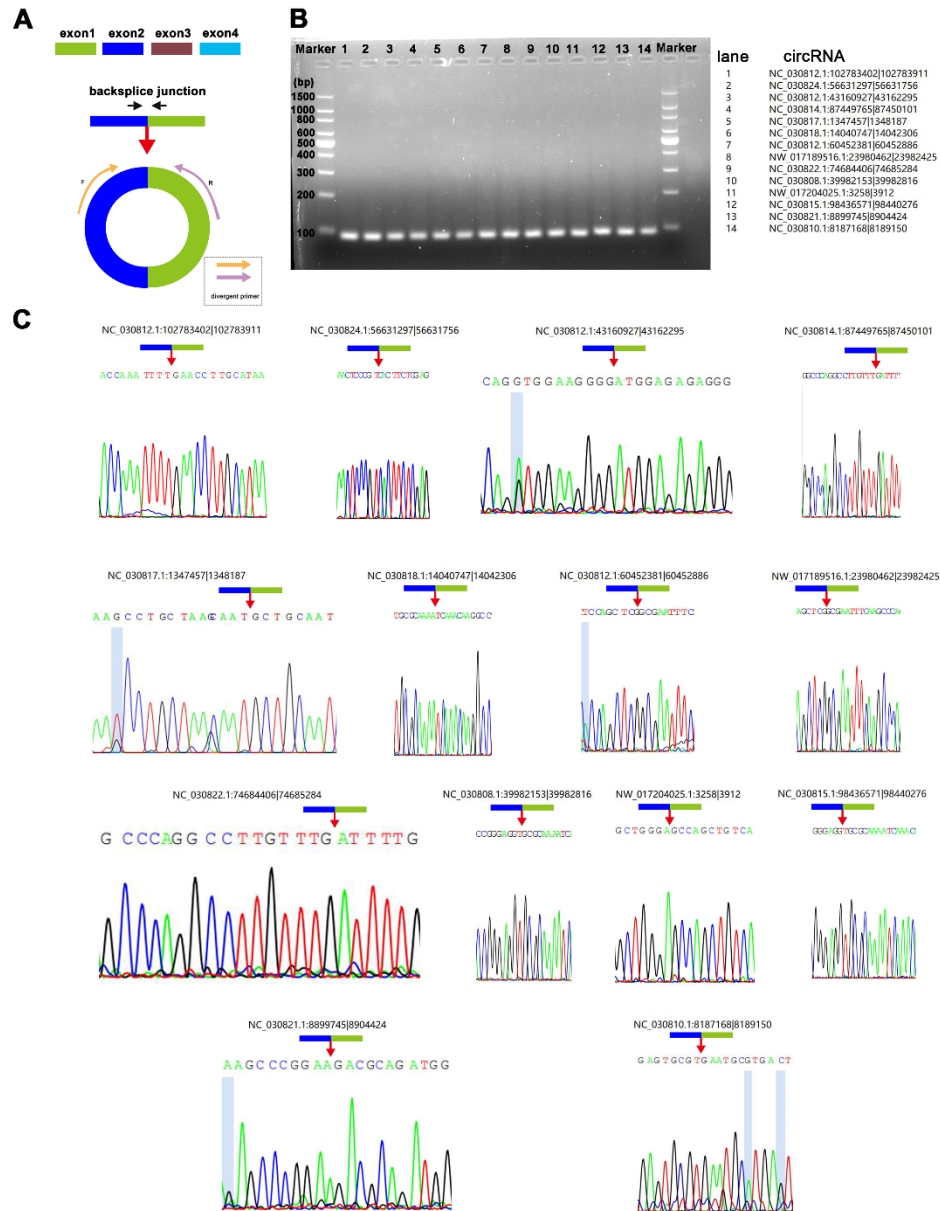


Figure S10. circRNAs sequence information was verified by Sanger sequencing. (A) A design schema of circRNAs divergent primers; (B) Agarose electrophoresis gel images of 14 circRNAs amplification products; (C) The looping site sequences of 14 circRNAs.

Ref. NC_030808.1_39982153_39982816	TTATCATCTGATGACCTCTACATATGCGCGAGATATGCGCA	40
Sanger_NC_030808.1_39982153_39982816	TATCACTATGATGACCTCTACATATGCGCGAGATATGCGCA	40
Consensus	TTATCATCTGATGACCTCTACATATGCGCGAGATATGCGCA	
Ref. NC_030808.1_39982153_39982816	AAATCAAAAGAGCTCGGGCTCTGAAATCTCGCGAGCTGG	80
Sanger_NC_030808.1_39982153_39982816	AAATCAAAAGAGCTCGGGCTCTGAAATCTCGCGAGCTGG	80
Consensus	AAATCAAAAGAGCTCGGGCTCTGAAATCTCGCGAGCTGG	
Ref. NC_030808.1_39982153_39982816	ATACATCGGGTCTT	93
Sanger_NC_030808.1_39982153_39982816	ATACATCGGGTCTT	93
Consensus	ATACATCGGGTCTT	

[illegible][illegible]

Ref_NC_030812.1_43160971 43162295	40
Sanger_NC_030812.1_43160971 43162295	40
Consensus	
Ref_NC_030812.1_43160971 43162295	80
Sanger_NC_030812.1_43160971 43162295	80
Consensus	
Ref_NC_030812.1_43160971 43162295	100
Sanger_NC_030812.1_43160971 43162295	100
Consensus	

ACTGCTGGGATGAGGAGACGCGGATACCGGCTCTGGCGAGTTTCGGGCGGCGCTGTGTTTCTTTCTGGGCTCTCTGCTCTGCTGTTGGAGGCG

[illegible]

T T G G A A A T A A S T G C A T C T T T T T T H A A T G S A S H E C A A T T T T G A A S E T T G S H A A T A A C A T C T C A A T G T T A A T G A A T G T O E T G T A C S T A A A C C



[CTGGGACGTAGAAACCGGTTCGCCATCCCAATTCAATTTTGAAGCCTCCCGTCCCTGTTAAGGCGCTCG](#)



[CTTTGAGTTCGGCGCTTAACATGGACTGGGGGTTCGCWAAACWAAGAAGCCCTCAGCCGAAATTGAGCGCTTCCTGTCACATGGTTTCTGCT](#)



[illegible][illegible]

Ref_NC_030824.1_5663129756631756 Sanger_NC_030824.1_5663129756631756 Consensus	TTGCGGCGGAGTTCGCGGTAAGCATGAGGATG TTGCGGCGGAGTTCGCGGTAAGCATGAGGATG TTCGGCGCGGAGTTCGCGGTAAGCATGAGGATG	40 40 40
Ref_NC_030824.1_5663129756631756 Sanger_NC_030824.1_5663129756631756 Consensus	TCCGCGGCGGAGTTCGCGGTAAGCATGAGGATG TCCGCGGCGGAGTTCGCGGTAAGCATGAGGATG TCCGCGGCGGAGTTCGCGGTAAGCATGAGGATG	80 80 80
Ref_NC_030824.1_5663129756631756 Sanger_NC_030824.1_5663129756631756 Consensus	CCGCGGCGGAGTTCGCGGTAAGCATGAGGATG CCGCGGCGGAGTTCGCGGTAAGCATGAGGATG CCGCGGCGGAGTTCGCGGTAAGCATGAGGATG	100 100 100
Ref_NC_030824.1_5663129756631756 Sanger_NC_030824.1_5663129756631756 Consensus	TTAAGCTGTGAGGATGATGCG TTAAGCTGTGAGGATGATGCG TTAAGCTGTGAGGATGATGCG	120 120 120

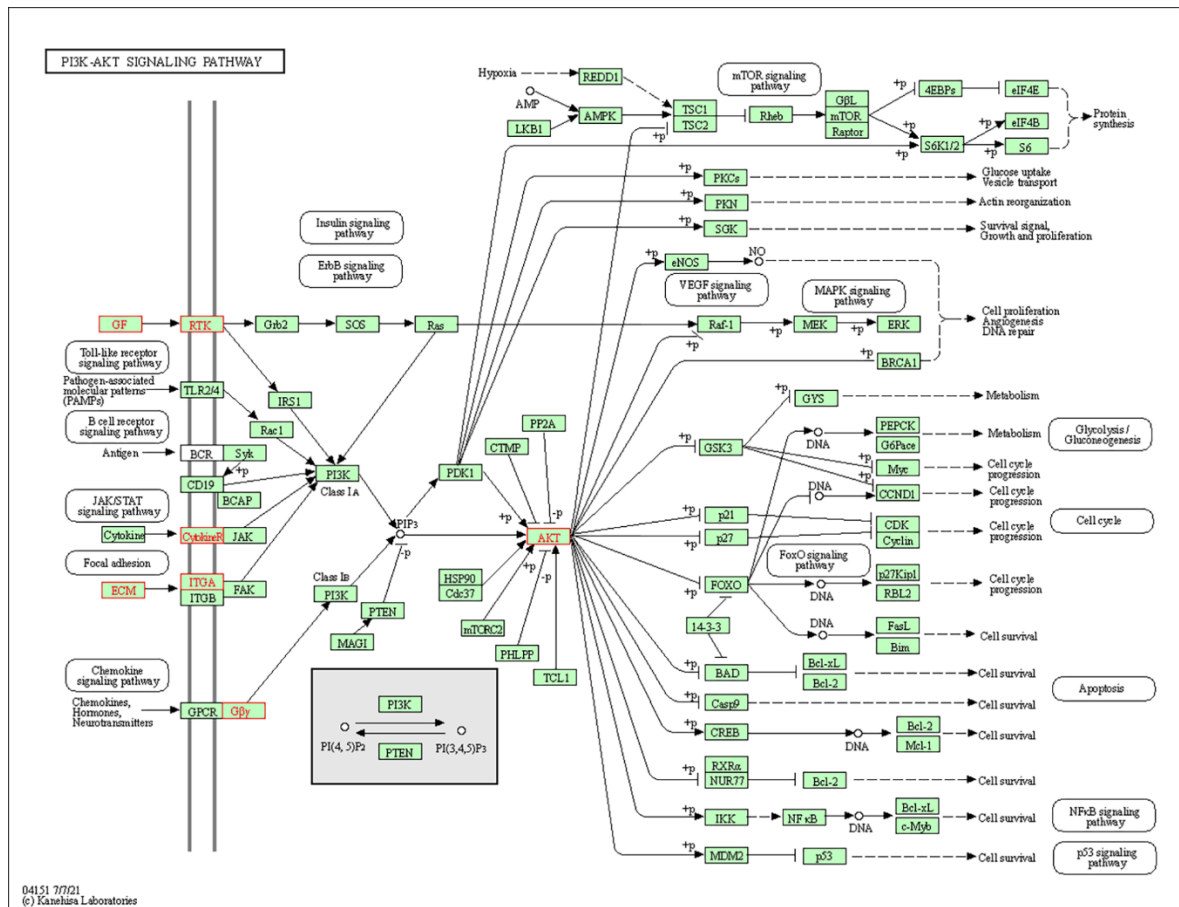


Figure S12. A map of PI3K-Akt signaling pathway.

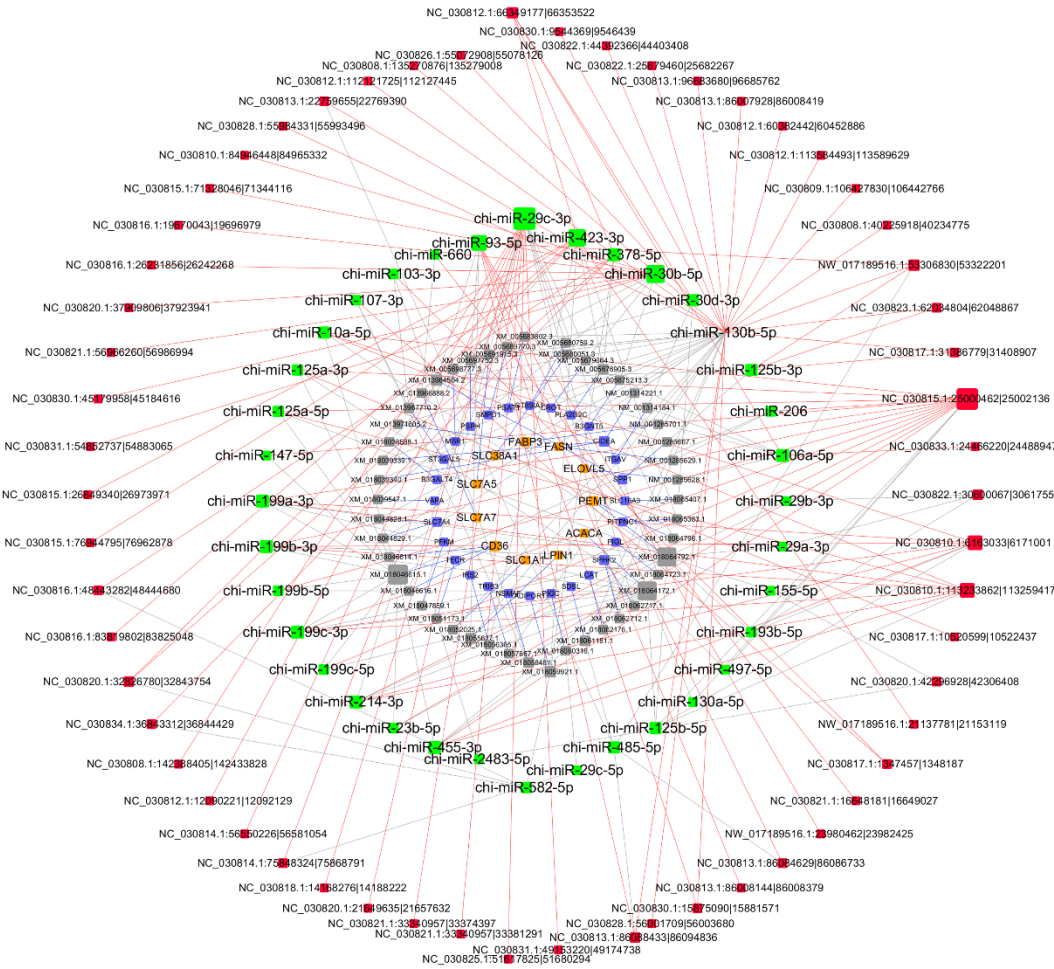


Figure S14. Analysis of circRNA-miRNA-mRNA ceRNA regulatory network related to mammary gland substance metabolism.

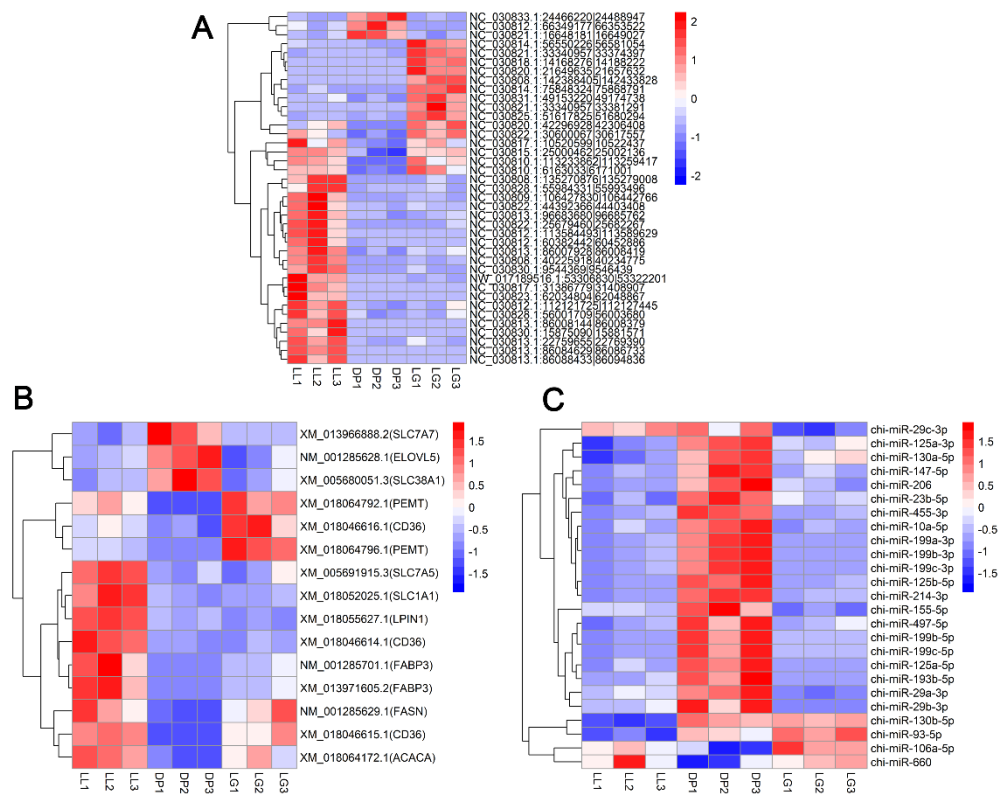


Figure S15. Expression heat map of mammary gland substance metabolism-related circRNAs, mRNAs, and miRNAs. (A) Expression heat map of circRNAs related to mammary gland substance metabolism; (B) Expression heat map of mRNAs related to mammary gland substance metabolism; (C) Expression heat map of miRNAs related to mammary gland substance metabolism.

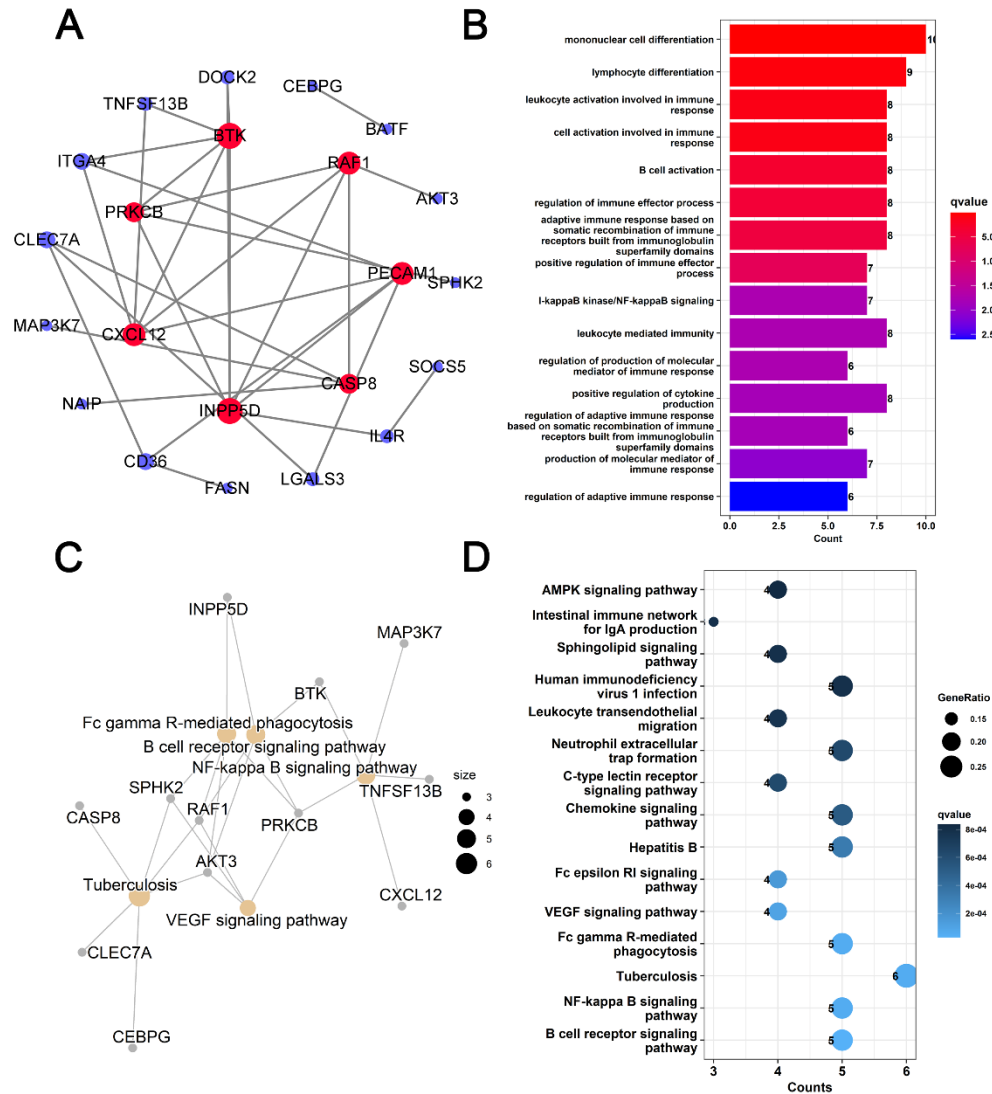


Figure S16. Analysis of immune-related circRNA-miRNA-mRNA ceRNA regulatory network in mammary gland. (A) PPI network analysis of mammary immune-related genes; (B) GO analysis of mammary immune-related genes; (C) Relationship between KEGG pathways and genes; (D) KEGG analysis of mammary immune-related genes.

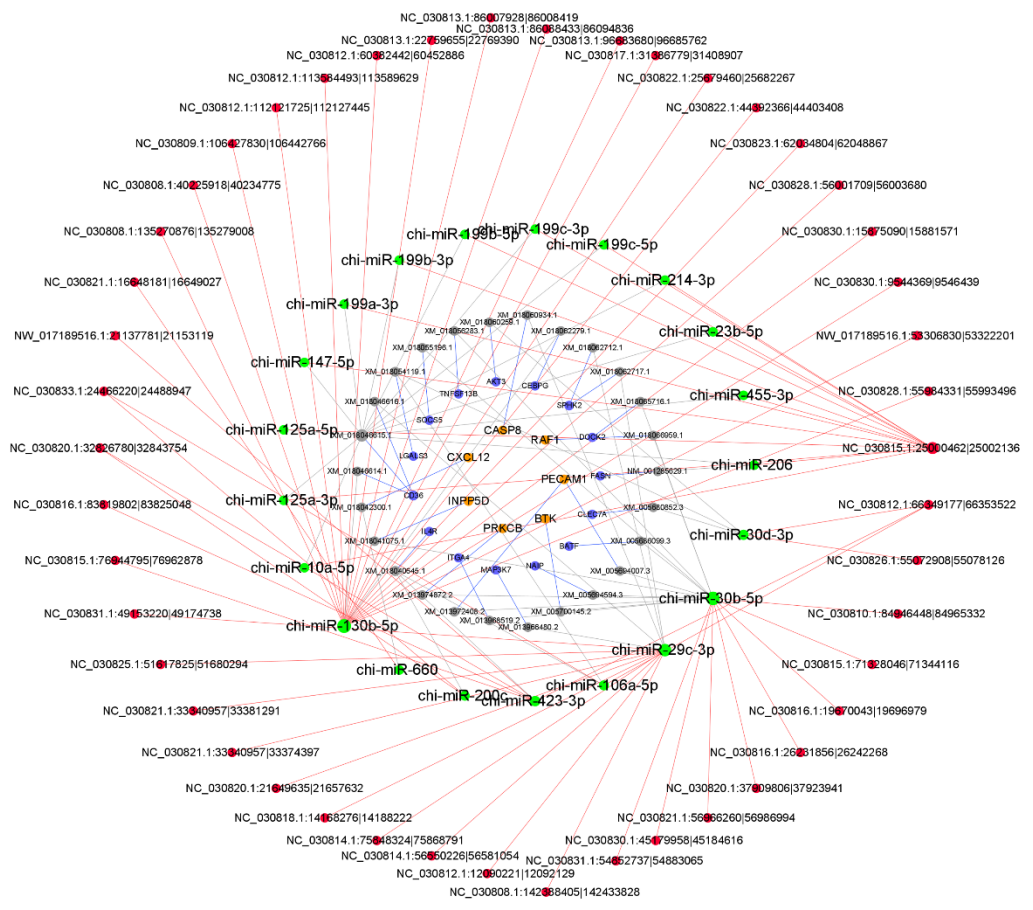


Figure S17. Analysis of circRNA-miRNA-mRNA ceRNA regulatory network related to mammary gland immunity.

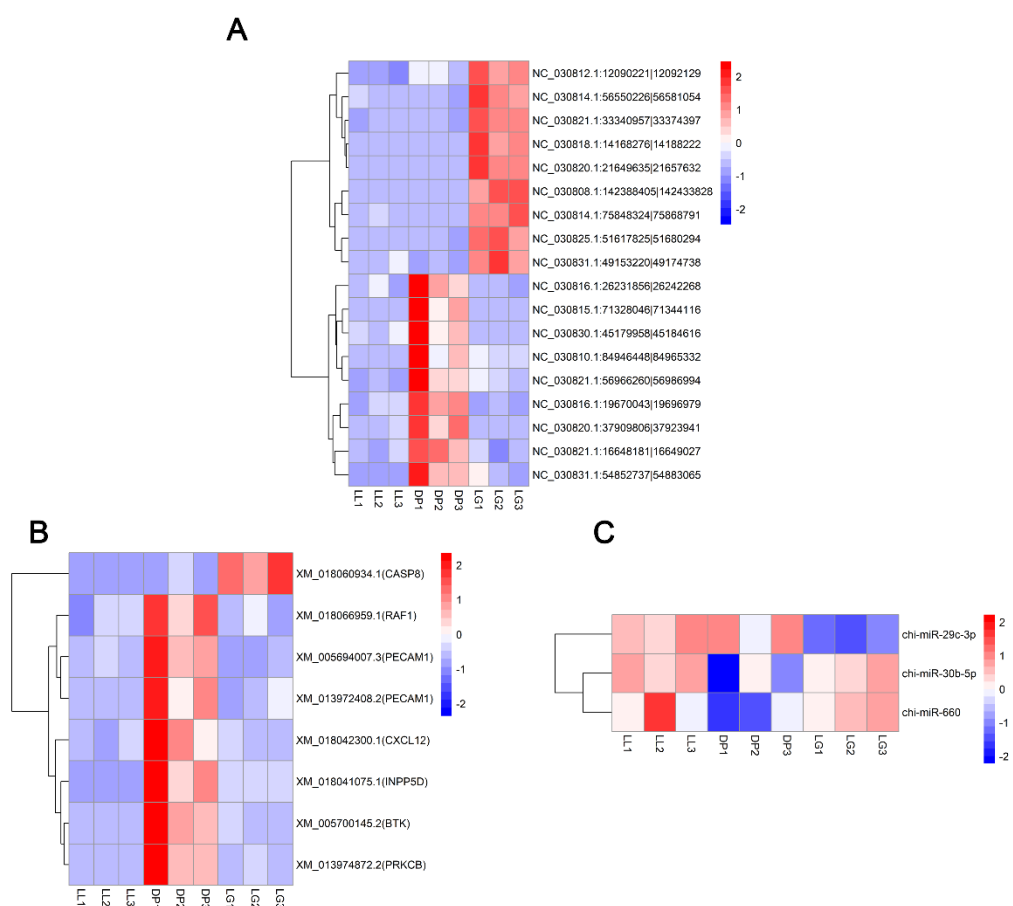


Figure S18. Expression heat map of mammary immune-related circRNAs, mRNAs, and miRNAs. (A) Expression heat map of mammary immune-related circRNAs; (B) Expression heat map of mammary immune-related mRNAs; (C) Expression heat map of mammary gland immune-related miRNAs.

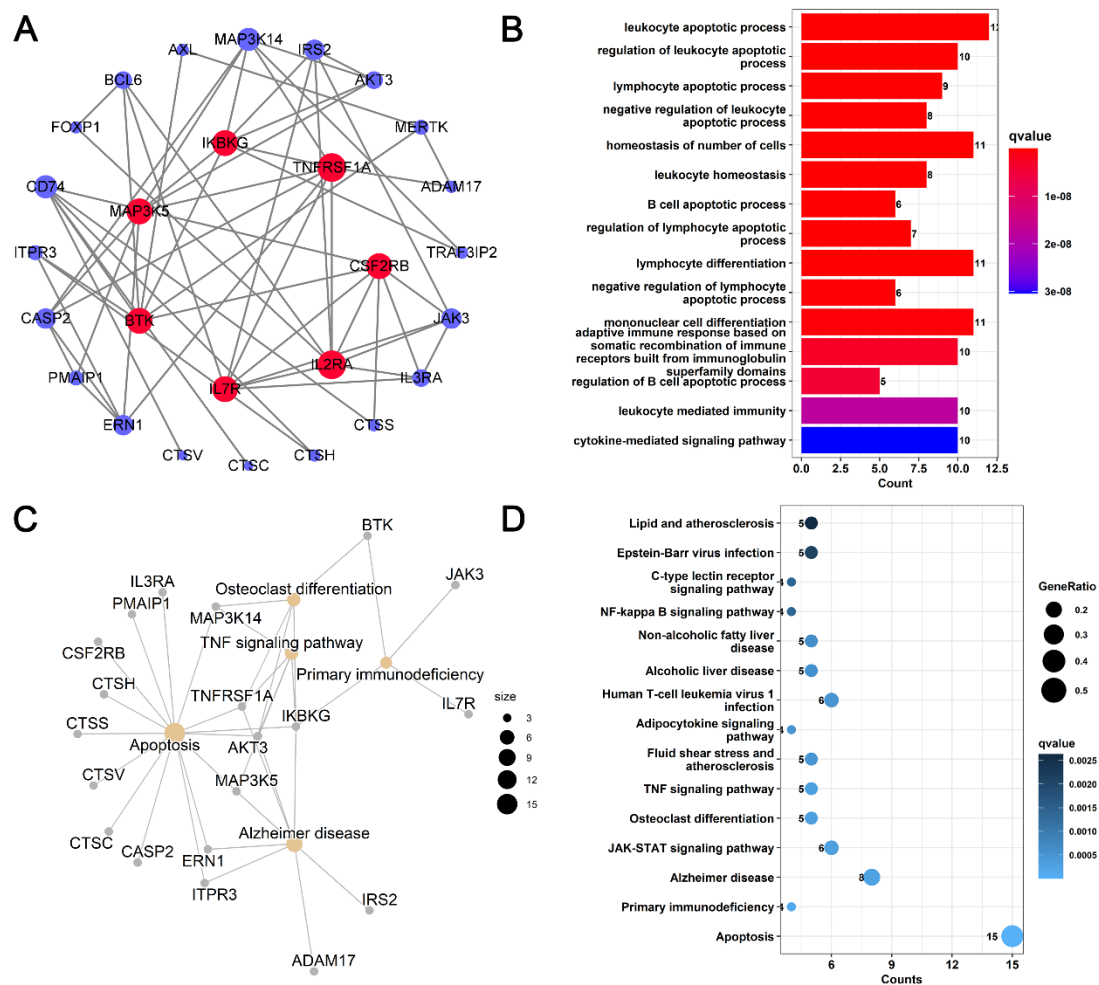


Figure S19. Analysis of mammary cell apoptosis-related circRNA-miRNA-mRNA ceRNA regulatory network. (A) PPI network analysis of mammary cell apoptosis-related genes; (B) GO analysis of mammary cell apoptosis-related genes; (C) The relationship between KEGG pathways and genes; (D) KEGG analysis of mammary cell apoptosis-related genes.

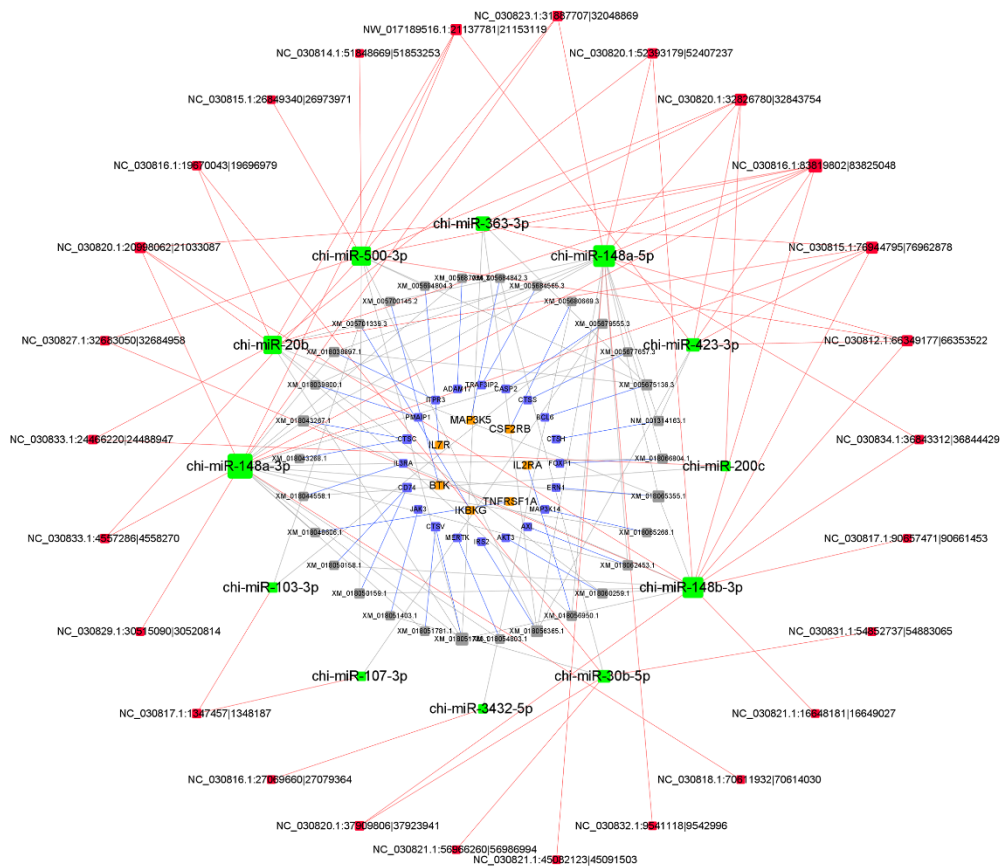


Figure S20. Analysis of circRNA-miRNA-mRNA ceRNA regulatory network related to mammary cell apoptosis.

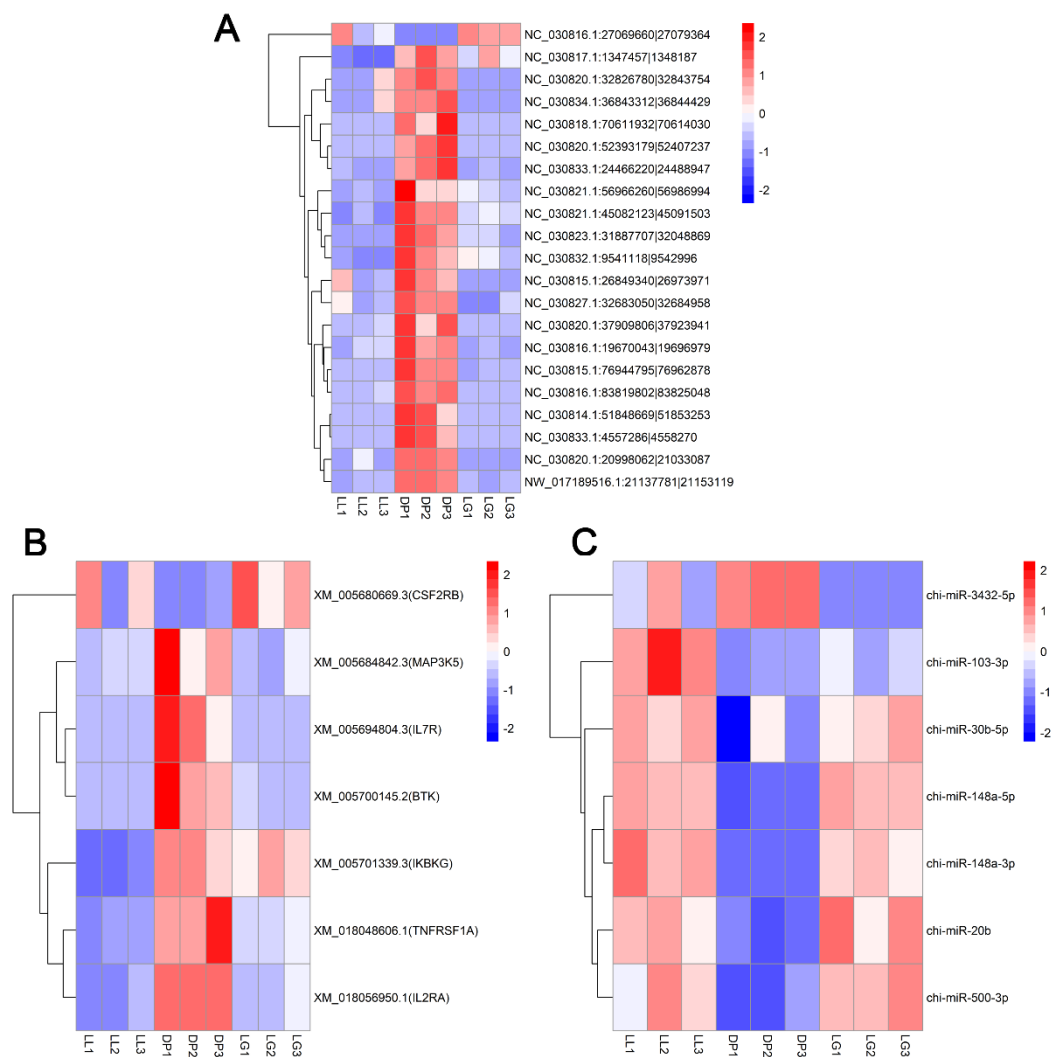


Figure S21. Expression heat map of mammary cell apoptosis-related circRNAs, mRNAs and miRNAs. (A) Expression heat map of mammary cell apoptosis-related circRNAs; (B) Expression heat map of mammary cell apoptosis-related mRNAs; (C) Expression heat map of mammary cell apoptosis-related miRNAs.