

MicroRNA-212 Targets *SIRT2* to Regulate Lipogenesis in Dairy Cows

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Short title: **MicroRNA-212 via targeting *SIRT2* regulates Lipogenesis**

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Summary

This study aimed to filter and verify miRNAs which may target *SIRT2* and then describe the mechanism that via targeting *SIRT2*, miRNA-212 can regulate lipogenesis in mammary epithelial cell lines. Milk fat metabolism is a complex process that is regulated by many factors; studies in recent years have revealed the role of an microRNA (miRNA)-mRNA interaction in the regulation of lipogenesis. In this study, bioinformatics analysis revealed that the bovine *silent information regulator homolog 2 (SIRT2)* gene is regulated by three miRNAs: miR-212, miR-375 and miR-655. Then the three miRNAs were verified and screened by qRT-PCR, western blot, and luciferase multiplex verification techniques and just miR-212 has targeting relationship with *SIRT2*, whereas miR-375 and miR-655 has no targeting relationship with *SIRT2*. The results of cotransfecting miR-212 and silencing RNA (siRNA) showed that by targeting *SIRT2*, miR-212 can regulate the expression of *fatty acid synthetase (FASN)* and *sterol regulatory element binding factor 1 (SREBP1)* but not peroxisome proliferator-activated receptor gamma (*PPAR γ*). The 5-ethynyl-2'- deoxyuridine (EdU) results showed that the overexpression of miR-212 could inhibit the proliferation of cells. Triglyceride (TAG) determination experiment showed that miR-212 increased the fat content of mammary epithelial cell lines. The study indicates that miR-212 could target and inhibit the expression of the *SIRT2* gene to promote the lipogenesis in mammary epithelial cell lines.