ACTUS NUTRITION

Animal Health

Stearic Acid Promotes Milk Synthesis

FROM THE MAKERS OF ENERGY BOOSTER AND RPMET™

The importance of additional stearic acid (C18:0) in the diet has been minimized in many recent published reports. Some researchers have recommended no additional C18:0 be fed due to its effects on fatty acid digestibility. However, these same researchers have ignored other published reports showing how highly enriched C18:0 increases feed intake (FI) linearly (Boerman and Lock 2015, Piantoni et al. 2015, and Shepardson and Harvatine 2021). The mammary gland can desaturate C18:0 into oleic acid, which is the second most abundant in milk and increases the fluidity of milk, and therefore often used as a feed additive (Jensen 2002). It has been confirmed that C18:0 can increase milk yield. Published studies have shown that the addition of SA to diets containing less rumen unsaturated fatty acids can effectively increase the milk yield of lactating cows by increasing FI. (Piantoni et al. 2015 and Shepardson and Harvatine 2021). New research (Li et al 2022) has discovered another mode of action regarding C18:0 effect on milk synthesis in vitro that is separate from the increase in FI. In practical nutrition, the effect of C18:0 on the lactation of dairy cows is controversial. It is important to clarify the effect of C18:0 on milk synthesis in dairy cows and its internal regulatory mechanisms. These researchers found that:

In summary, this study confirmed that SA was transported into BMECs, increased the expression of signaling axes, and ultimately promoted milk synthesis. This study clearly demonstrated that SA promoted milk synthesis and provided an important insight into the precise regulatory mechanisms of milk synthesis, which may provide theoretical support for the practical application of SA in dairy cow feeding. The importance of C18:0 to the lactating cow is becoming more and more clear . Feeding higher levels of C18:0 to lactating cows is warranted. The C18:0 nay Sayers are becoming a minority.

(Stearic Acid Activates the PI3K-mTOR-4EBP1/S6K and mTOR- SREBP-1 Signaling Axes through FATP4-CDK1 To Promote Milk Synthesis in Primary Bovine Mammary Epithelial Cells. Li, F. et al 2022 J Agric Food Chem 2022. 70:4007-4018.)

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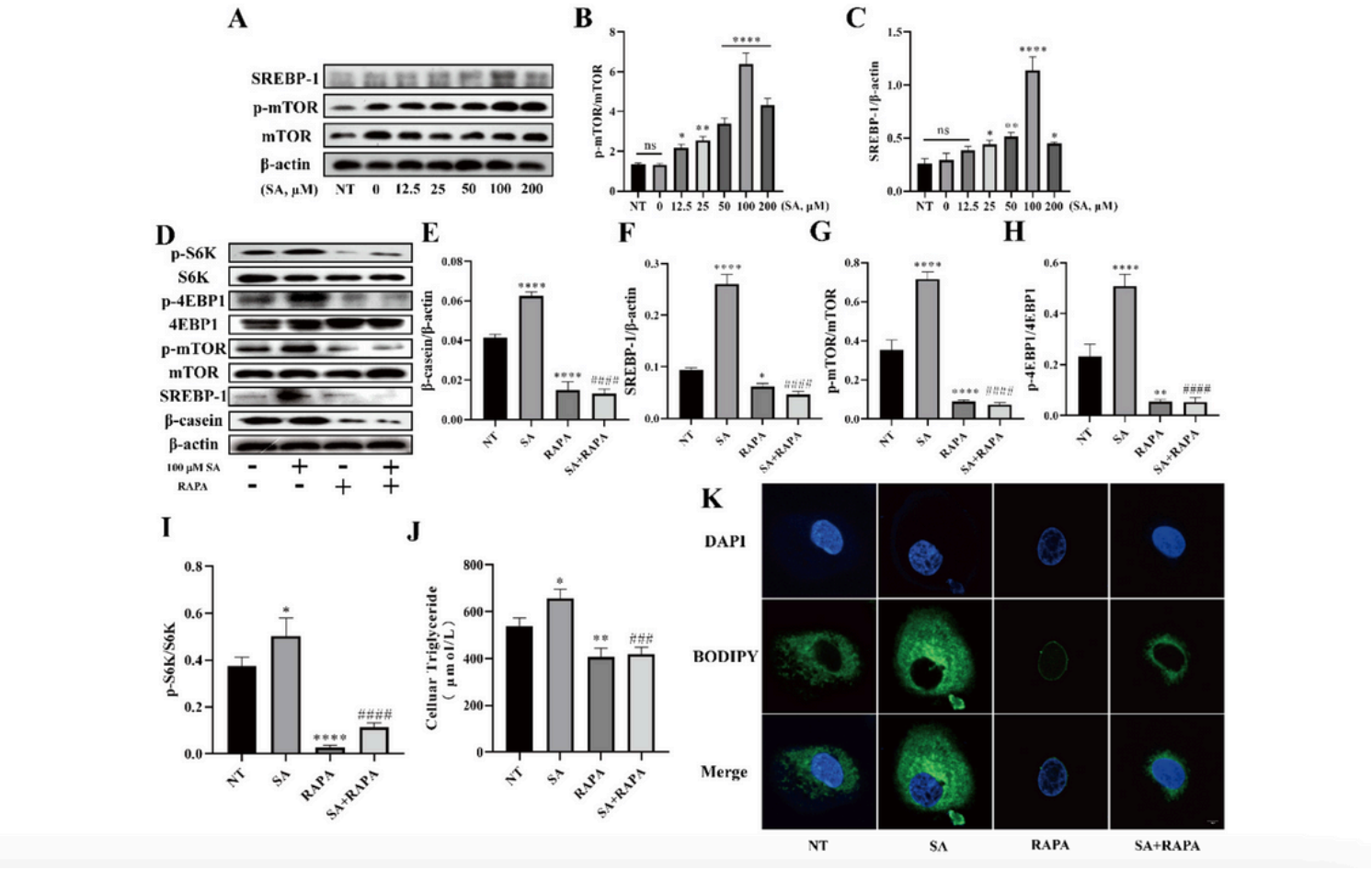

Figure 3. SA activates the mTOR-4EBP1/S6K and mTOR-SREBP-1 signaling pathways through PI3K in BMECs. (A) BMECs were pretreated with 15 μM LY294002 for 1 h and stimulated with 100 μM SA for 24 h, and the protein levels of p-PI3K, β-casein, SREBP-1, p-mTOR, p-4EBP1, and p-S6K were determined by western blotting. (B–G) Densities of p-PI3K, β-casein, SREBP-1, p-mTOR, p-4EBP1, and p-S6K bands were quantified, and β- actin was used as a loading control. (H) Amount of triglyceride in the cell was determined by the tissue cell triglyceride assay kit. (I) Triglycerides were stained with BODIPY and observed using a confocal laser microscope. Each experiment was repeated three to five times, and the results are shown as mean±SD. *p<0.05 , **p<0.01,*** p<0.005, and****p<0.0001 compared with the NT sample; #p<0.05, ##p<0.01, ###p<0.005, and #### p < 0.0001 compared with the SA-treated sample. (Adapted from Li et al. 2002)