

Effects of an essential oils blend on productivity and methane emissions in dairy cows: meta-analysis

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There is growing pressure to identify feed additives which increase productivity and decrease methane emissions without compromising animal health. Essential oils (EO) have shown positive effects on the ruminal fermentation *in vitro*, but there are few *in vivo* studies describing animal responses and results are often inconsistent. This study described the effects of supplementing a specific EO blend (Agolin[®] Ruminant) at 1g/d per cow in comparison to non-treated animals. A total of 20 *in vivo* studies and farm trials were identified and a meta-analysis was performed to determine the standardized effect size on milk yield, rumen fermentation and methane emissions. Results indicated that an adaptation period of at least 4 weeks of treatment is required. Whereas short-term studies showed minor and inconsistent effects of EO, long-term trials (≥ 4 weeks) revealed that EO supplementation increases milk yield (+3.8%, $P < 0.001$), fat and protein corrected milk (+4.5%, $P < 0.001$) and feed efficiency (+3.3%, $P < 0.001$) without further changes in milk composition or feed intake. Long-term treatment also decreased methane production per day (-9.6%, $P < 0.001$), per DM intake (-13.6, $P = 0.001$) and per milk yield (-12.7%, $P = 0.042$) without having negative effects on the body condition score, fertility or health. In conclusion, although the mode of action is still unclear, this study suggested that Agolin supplementation may promote a subtle modulation of the rumen fermentation and protozoal levels which favoured the efficiency of the cow. Despite the small number of studies considered, these findings show that Agolin represents an encouraging alternative to improve productivity in dairy cattle.

Index terms: Bos taurus, essential oils, meta-analysis, methane, milk yield