Reducing methane emissions from the livestock industry

Methane emissions account for around 44% of total livestock greenhouse gas emissions. Scientists are currently investigating ways to reduce methane emissions from livestock through the use of technology and management. The majority of the research is looking at how we can control methane emissions through the use of nutrition.

A project led by Scotland's Rural College (SRUC) and involving the Universities of Aberdeen and Bristol has recently completed work to better understand the long-term effects of two commercially available additives on methane emissions, cattle performance and meat quality when fed with different finishing rations to a range of cattle breeds.

Table 1: Additives and rations investigated

Additives	**1. Nitrates (calcium nitrate)** **2. Oils (rapeseed cake and maize distillers' grains)**
Finishing rations	**1. Forage-based ration - 50-58% DM as grass silage and barley whole crop silage** **2. Concentrate-based ration – 74% DM rolled barley**

Cattle were introduced to the diets containing added supplementation during a four-week adaption phase when the amount of additive was gradually increased to the required level.

Cattle taking part in the study achieved growth rates ranging between 1.2 and 1.8kg/day. No adverse effects from the additives were observed, except in one instance where adding nitrate caused a slight reduction in daily liveweight gain. Methane emissions were on average 37% lower when animals were fed the concentrate ration, compared to the forage-based ration (table 2).

Table 2: Methane emissions produced from different rations

Treatment	Forage-based ration (no additive)	Forage-based ration with nitrate	Forage-based ration with oils	Concentrate ration (no additive)	Concentrate ration with nitrate	Concentrate ration with oils
Methane emissions (g/kg DMI)	**25.1**	**20.6**	**23.2**	**14.6**	**15.4**	**15.7**

Both additives inhibited methane production in the forage-based diet, however they had no effect on the concentrate ration. Nitrate had the largest effect, reducing emissions by 17%, compared with 7.5% for oil supplementation (Figure 1).

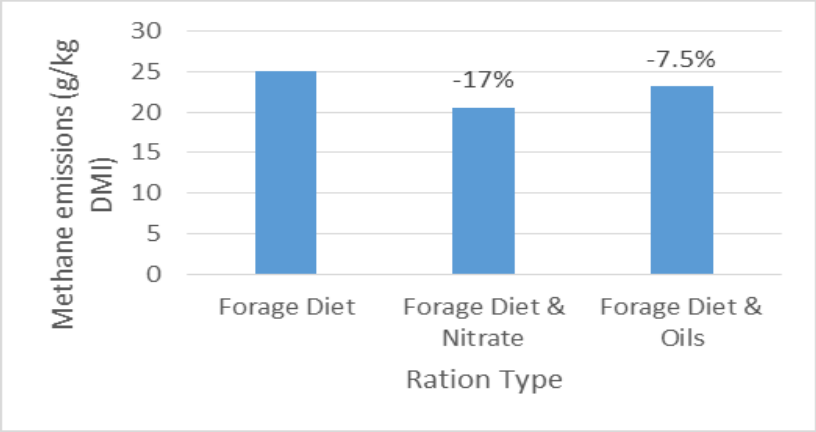

Figure 1: Effect of additives on methane production

While feeding nitrate has some advantages in terms of reducing methane, in both trials it was not cost effective. Studies carried out in the dairy industry have also looked at the effect of introducing oils to dairy cow diets. Fat supplements investigated included myristic oil, rapeseed oil, safflower oil and linseed oil. The study found that myristic oil reduced methane emissions the most in terms of grams per day, however safflower oil gave the greatest reduction in methane emissions per kg of milk produced. The study highlighted that the inclusion of fat supplements will reduce methane emissions through changes to rumen microbial communities, however the process can also compromise performance.

Feeding additives to cattle can be recommended provided its use is economically competitive and excessive oil levels in the diet are avoided (less than 6% in DM).

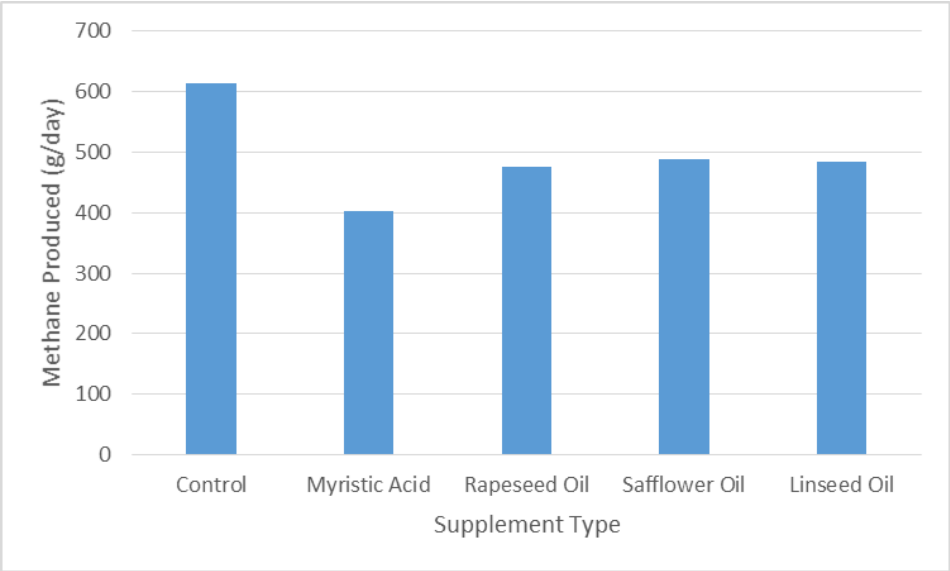

Figure 2: The effect of fat supplementation on methane emissions from dairy cows

Sources:

Huhtanen, P. 2015. Swedish University of Natural Sciences
RuminOmics. 2015. Ruminant livestock production: Improving efficiency and reducing environmental impact regional workshop – Edinburgh
Hyslop, J. 2016. Nutribeef Project