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| **Title:** *(Use Normal style (Times New Roman 12). Only capitalise the first letter of the first word. No full stop at the end of the title)* |
| Effect of supplementing calcium peroxide on performance and methane emissions in dry ewes |
| **Summary:** *(Your summary (Times New Roman 10) must use Body text style and must not be longer than this box)* |
| **Application** Calcium peroxide can be added to the diet of ewes to reduce methane production and intensity without affecting feed intake.**Introduction** Methane production by livestock has been of major interest due to its significant contribution to anthropogenic GHG emissions and energy loss to the animal. Over the last decade, a variety of dietary manipulation approaches have been proposed to reduce enteric methane emissions in ruminants with limited success mainly due to the requirement of continuous feeding and therefore costs, negative effects on animal production on pasture based systems. Therefore, if feed additives are to become part of a successful abatement strategy for national agricultural systems, it is essential that they are shown to be effective on pasture-based systems. The curent study examined the effect of supplementing calcium peroxide, a novel methane inhibitor, in the diet to reduce methane emissions from enteric fermentation using dry ewes.**Materials and Methods** Sixty Lowland crossed ewes were assigned into a continuous design study for 112 days to assess the effects of feeding calcium peroxide on animal performance and methane emissions. Three groups of ewes (20 ewes/group) were formed and balanced by age, body wight (BW) and body condition score (BCS). The additive was added to the concentrate pellets (dry matter (DM) basis) as follows: control (0.0%), medium (5.0%) and high (7.5%). Limestone was used to balance mineral concentrations in the 3 concentrate pellets. Grass silage was fed libitum, whilst the amount of concentrate was periodically adjusted (20% DM basis). DM intake (DMI) was recorded daily, whilst BW and BCS were recorded weekly. Enteric methane emissions were measured using a GreenFeed unit. Response variables were analysed using REML, with treatment as a fix effect and ewe as random effect (GenStat 21st ed., VSNI Ltd).**Results** Ewes supplemented with medium or high doses of calcium peroxide showed 16% or 19% greater (P = 0.011) average daily gains (ADG) than those in the control diet. The DMI (P = 0.562) and BCS (P = 0.879) did not differ between groups. Methane production was 11% lower (P = 0.040) in ewes consuming the high additive diet when compared to control ewes. Methane intensity was 17.6% and 27.5% lower (P < 0.001) in ewes consuming diets with medium and high additive content than in ewes receiving the control diet. Methane yield did not differ (P = 0.126) between treatments. **Table 1** Performance and methane emissions of dry ewes supplemented with calcium peroxide in the concentrate diet.

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|  | **Control** | **Medium** | **High** | **SED** | **P-Val** |
| Initial body weight (BW; kg) | 82.8 | 81.3 | 80.9 | 1.04 | 0.837 |
| Initial body condition score (BCS) | 3.33 | 3.28 | 3.07 | 0.193 | 0.361 |
| Dry matter intake (DMI; kg/d) | 1.99 | 2.04 | 1.97 | 0.066 | 0.562 |
| Silage DMI (kg/d) | 1.59 | 1.63 | 1.56 | 0.065 | 0.564 |
| Meal DMI (kg/d) | 0.40 | 0.41 | 0.41 | 0.004 | 0.252 |
| Average daily gain (kg/d) | 0.148a | 0.176b | 0.183b | 0.0119 | 0.011 |
| Body condition score | 3.75 | 3.78 | 3.84 | 0.161 | 0.879 |
| Methane before experiment (g/d) | 48.8 | 48.1 | 50.2 | 1.06 | 0.775 |
| Methane (g/d) | 48.2b | 47.0ab | 42.9a | 1.05 | 0.040 |
| Methane yield (g/kg DMI) | 24.4 | 23.4 | 22.2 | 1.08 | 0.126 |
| Methane intensity (g/kg BWG) | 331.1c | 272.9b | 239.9a | 19.05 | <0.001 |

*BWG = Body weight gain***Conclusions** The inclusion of the calcium peroxide at ~1.7% (high dose) of the total diet did not affect feed intake, whilst increased ADG and reduced methane production and intensity in dry ewes.**Acknowledgments** to our colleagues in Teagasc. This project was funded by Department of Agriculture, Food and the Marine (DAFM), Department of Agriculture, Environment and Rural Affairs (DAERA) and GlasPort Bio.  |