

The response to an oral drench of propylene glycol is modified in dairy goats previously fed straw for two days compared to control fed goats

Andrew Ponter, Alexandra Eymard, Ophelie Dhumez, Christine Duvaux-Ponter, Nicolas Friggens

► **To cite this version:**

Andrew Ponter, Alexandra Eymard, Ophelie Dhumez, Christine Duvaux-Ponter, Nicolas Friggens. The response to an oral drench of propylene glycol is modified in dairy goats previously fed straw for two days compared to control fed goats. 10. International Symposium on the Nutrition of Herbivores (ISNH10), Sep 2018, Clermont-Ferrand, France. Cambridge University Press, Advances in Animal Biosciences, 9 (3), 2018, 10th. International Symposium on the Nutrition of Herbivores (ISNH10). hal-02737536

HAL Id: hal-02737536

<https://hal.inrae.fr/hal-02737536>

Submitted on 2 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

The response to an oral drench of propylene glycol is modified in dairy goats previously fed straw for two days compared to control fed goats

Andrew A. Ponter², Alexandra Eymard³, Ophélie Dhumez³, Christine Duvaux-Ponter³, Nicolas C. Friggens³

¹UMR BDR, INRA, Ecole Nationale Vétérinaire d'Alfort, Université Paris Saclay, 78350, Jouy en Josas, France, ²Ecole Nationale Vétérinaire d'Alfort, 94700, Maisons-Alfort, France, ³UMR Modélisation Systémique Appliquée aux Ruminants, INRA, AgroParisTech, Université Paris-Saclay, 75005, Paris, France

E-mail: andrew.ponter@vet-alfort.fr

Take home message The composition of the diet given to goats influences their response to a propylene glycol drench.

Introduction Plasma concentrations of glucose and insulin are known to increase in response to dietary propylene glycol (PG) (Miyoshi *et al.*, 2001). PG is a gluconeogenic precursor widely used in the prevention and treatment of ketosis. It increases the molar percentage of ruminal propionate in postpartum dairy cattle (Christensen *et al.*, 1997). After oral administration, a portion of PG is fermented in the rumen to propionate, but the majority escapes the rumen untransformed and is converted to glucose by the liver (Rizos *et al.*, 2008). High levels of glucose stimulate pancreatic insulin secretion which in turn reduces plasma non-esterified fatty acids (NEFA) if animals are mobilising adipose tissue reserves. We tested whether causing lipomobilisation by giving a straw diet had an influence on the metabolic response to PG.

Material & methods Sixteen dairy goats were selected at parturition and fed *ad libitum* a TMR to cover dietary requirements for lactation. On day 21 after parturition the goats received an initial PG drench (1 mL/kg LW). Starting on day 26 the goats received straw *ad libitum* instead of the regular diet and on day 28 the goats received a second PG drench (1 mL/kg LW). Blood samples were taken at -10, 0, 15, 30, 45, 60 and 120 min in relation to each drench and plasma was analysed for insulin, glucose and NEFA. Statistical analysis was performed with PROC Mixed in SAS using the Repeated statement to account for a time effect.

Results The glucose and insulin response to the PG drench was rapid in control animals but delayed when they received straw for 2 days prior to the drench (Fig. 1). Plasma NEFA were significantly higher in straw + PG compared to control + PG goats (respectively 1.65 ± 0.06 mmol/L vs. 0.56 ± 0.06 mmol/L, $p < 0.0001$) but did not decrease after the PG drenches in either group (results not shown).

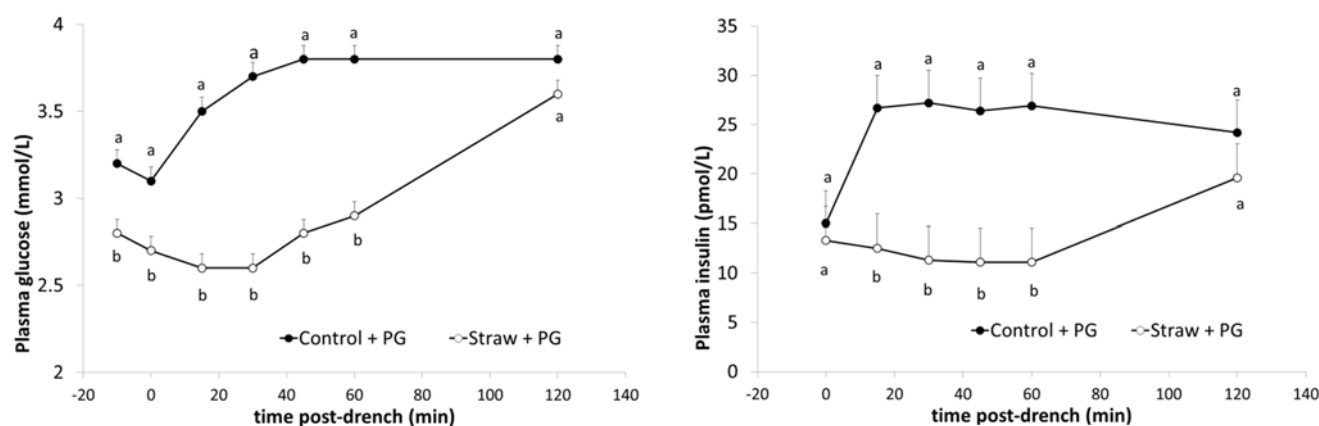


Figure 1 Plasma glucose and insulin after a propylene glycol drench in dairy goats fed either a control diet (control + PG) or straw for 2 days (straw + PG) ($n=16$, $lsmean \pm s.e.$, a,b at a time point indicate a difference between treatments, $p < 0.05$).

Conclusion Feeding straw for 2 days prior to a PG drench delayed the increase in plasma glucose and insulin compared to control fed goats. This may be due to a slower rumen emptying rate caused by the straw compared to the lactation diet and this may mean that more time was required for the PG to reach the liver and be converted into glucose. It is unclear why NEFA concentrations were unaffected by PG.

Acknowledgements The authors would like to thank the goat unit of UMR INRA-AgroParisTech MoSAR for care of the animals, B. Lagofun for technical assistance and DIFAGRI, France for the PG.

References

- Christensen JO, Grummer RR, Rasmussen FE and Bertics SJ 1997. *Journal of Dairy Science* 80, 563-568.
 Miyoshi S, Pate JL and Palmquist DL 2001. *Animal Reproduction Science* 68, 29-43.
 Rizos D, Kenny DA, Griffin W, Quinn K, Duffy P, Mulligan FJ, Roche JF, Boland MP and Lonergan P 2008. *Theriogenology* 69, 688-699.