Berg+Schmidt
Animal Nutrition

For extra performance.

# #2436


C. Brock[1], Chad Risley[2]

[1] Berg+Schmidt GmbH & Co. KG Animal Nutrition, Hamburg, Germany

[2] Berg+Schmidt America LLC, Libertyville, IL

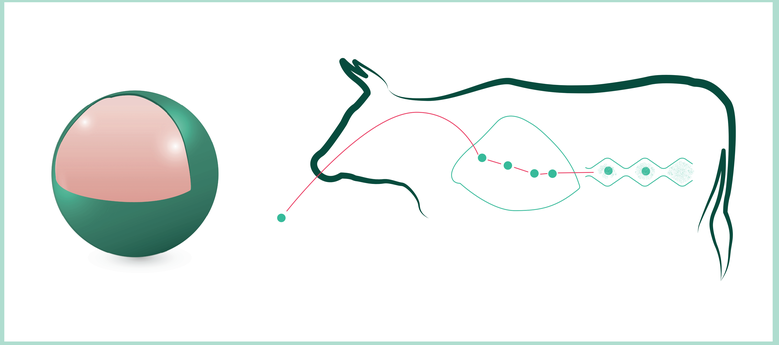

## Effect of rumen-protected sugar supplementation on milk performance and subclinical ketosis of dairy cows in the transition period

### Introduction

As dairy cows absorb insufficient amounts of glucose from the gastrointestinal tract, they rely on gluconeogenesis which limits hepatic fat oxidation (Wiltrout and Satter, 1971). Therefore, the risk of fatty liver syndrome and subclinical ketosis (SCK) increases as not fully oxidized fatty acids are re-esterified and stored or metabolized into ketone bodies (Grummer, 1993). Elevated blood levels of the ketone β-hydroxy-butyric acid (BHB) are associated with increased risk of metabolic disorders and infectious diseases (Suthar et al., 2013, Duffield et al., 2009) as well as a loss in milk production and fertility (Chapinal et al., 2012, Walsh et al., 2007). Providing more available glucose to the small intestine by rumen-protected sugar (RPS) may reduce the necessity of gluconeogenesis (Judson et al., 1968).

### Objective

The objective of the present study was to determine the effects of supplementing RPS to improve milk performance and to lower the risk of subclinical ketosis in early lactation.



### Materials and Methods

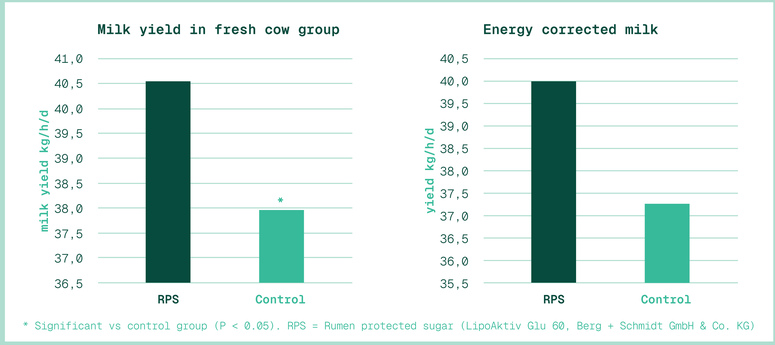
RPS (LipoAktiv Glu 60, Berg + Schmidt GmbH & Co. KG, Hamburg) was supplemented in the transition period of dairy cows at a farm in Germany with more than 700 milking cows. The cows received 150 g/h/d RPS 3 wk before estimated calving date and 200 g/h/d 3 wk after calving. The following data were collected:

- weekly data of milk yield
- weekly data of milk components
- weekly dry matter intake per pen
- blood β-hydroxy butyric acid (BHB) levels during first 4wk after calving

t-tests were used to determine the significance between means per treatment and $P < 0.05$ was considered significant using R version 4.1.1.

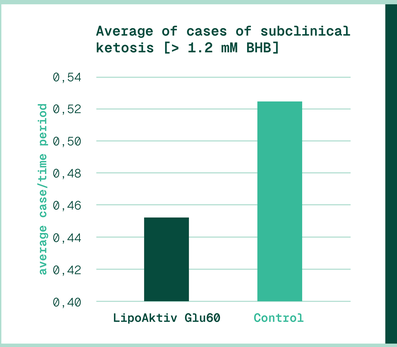
### Results and Discussion

Milk performance of fresh cows (0 – 20 DIM) supplemented with RPS was significantly higher compared to control cows (40.6 vs 38.0 kg/h/d, P = 0.002). Providing greater amounts of glucose to the small intestine increases the availability of glucose for the udder to increase lactose synthesis and with this milk yield (Rigout et al., 2002). Supplementation of RPS had no significant effect on energy-corrected milk yield (40.0 vs 37.3 kg/h/d, P = 0.3) or milk solids (2.94 vs 2.66 kg/h/d, P = 0.34) in lactating cows compared to control cows (each group averaged 165 DIM).




* Significant vs control group (P < 0.05). RPS = Rumen protected sugar (LipoAktiv Glu 60, Berg + Schmidt GmbH & Co. KG)

There was no significant difference in dry matter intake (DMI) between treatments (25.5 vs 24.8 kg/h/d, P = 0.28) or feed conversion rate (1.60 vs 1.53, P = 0.14) in fresh cows. There were on average less incidence of cows with blood BHB levels above 1.2 mM in the treated group compared to cows fed the control diet, but the effect was not statistically significant (0.45 vs 0.52, P = 0.61). A decrease of blood BHB level was expected as hepatic fat oxidation should increase by less necessity on gluconeogenesis due to greater sugar availability in the blood stream from the RPS. In general there was a low incidence of subclinical ketosis in the herd, meaning RPS was instead used to support better milk synthesis.




### Conclusion

In conclusion, some effect was found in reducing cases of subclinical ketosis in this study, alongside a significant improvement in milk yield in fresh cows.

### Literature


Chapinal N., S.J. LeBlanc, M.E. Carson, K.E. Leslie, S. Godden, M. Capel, J.E.P. Santos, M.W. Overton, T.F. Duffield (2012): Herd-level association of serum metabolites in the transition period with disease, milk production, and early lactation reproductive performance. J. Dairy Sci. 95:5676-5682.

Duffield T.F., K.D. Lissemore, B.W. McBride, K.E. Lesslie (2009): Impact of hyperketonaemia in early lactation dairy cows on health and production. J. Dairy Sci. 92: 571-580.

Grummer R. (1993): Etiology of Lipid-Related Metabolic Disorders in Periparturient Dairy Cows. J. Dairy Sci. 76:3882-3896.

Judson G.J. E. Anderson, J.R. Luick, R.A. Leng (1968): The contribution of propionate to glucose synthesis in sheep given diets of different grain content. Br.J.Nutr. 22, 69.

Nombekela S.W., M.R. Murphy, H.W. Gonyou, J.I. Marden (1994): Dietary Preferences in early lactation cows as affected by primary tastes and some common feed flavors. J. Dairy Sci. 77:2393-2399.

Rigout S., S. Lemosquet, J.E. van Eys, J.W. Blum, H. Rulquin (2002): Duodenal glucose increases glucose fluxes and lactose synthesis in grass silage-fed dairy cows. J. Dairy Sci. 85:595-606.

Suthar V.S., J. Canelas-Raposo, A. Deniz, W. Heuwiese (2013): Prevalence of subclinical ketosis and relationships with postpartum diseases in European dairy cows. J. Dairy Sci. 96:2925-2938.

Walsh R.B., J.S. Walton, D.F. Kelton, S.J. LeBlanc, K.E. Leslie, T.F. Duffield (2007): The effect of subclinical ketosis in early lactation on reproductive performance of postpartum dairy cows. J. Dairy Sci. 90:2788-2796.

Wiltrout D.W. and L.D. Satter (1971): Contribution of Propionate to Glucose Synthesis in the Lactating and Nonlactating Cow. J.Dairy Sci. Vol. 55, No.3.