Effects of Yeast based Direct Fed Microbial Supplementation on the Performance of High Producing Dairy Cows

By

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Submitted in partial fulfilment of the requirements for the degree
Magister Scientiae Agriculturae
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DECLARATION

I, Hendrik Cornelius van der Watt Leicester, declare that this dissertation, which I hereby submit for the degree MSc (Agric) Animal Science: Animal Nutrition at the University of Pretoria is my own work and that it has not been previously submitted by me for a degree at this or any other tertiary institution.

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SUMMARY

Effects of Yeast based Direct Fed Microbials on the Performance of High Producing Dairy Cows

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The use of direct fed microbials (DFM) is common in dairy rations worldwide but, due to variability in animal responses, more research is needed in order to demonstrate their efficacy. These products need to be tested in the environment they are going to be used in because of potential interactions of responses with feeding conditions. The objective of this study was to determine the effect of two yeast (*S. cerevisiae*) based feed additives on the production response of high producing dairy cows.

The study consisted of three high producing Holstein cow pens (± 315 cows/pen) that were used in a 3 x 3 Latin square design experiment. The three experimental treatments were: 1) Basal total mixed ration (Control), 2) Control supplemented with the 'DV XPC' yeast culture (14 g/cow/d), 3) Control supplemented with the Yeasture DFM (10 g/cow/d). The experimental periods were 28 days with the last 7 days for data collection.

Milk yield was higher for the Yeasture treatment ($P = 0.01$) compared to the control. With the increased milk yield there was also an increase in milk true protein ($P = 0.01$), lactose ($P = 0.01$) and energy ($P = 0.02$) outputs as well as a tendency for milk fat ($P = 0.07$) to increase. Milk yield and yield of milk components, milk energy output and levels of milk components were not impacted by feeding DV XPC. Total NE output for both the treatments vs. Control was increased, DV XPC ($P = 0.01$) and Yeasture ($P < 0.01$). The increased total NE output for Yeasture was all due to the increase in milk energy output while for DV XPC it was due to numerical increases in milk and BCS energy.

Neither treatment impacted the NE_L density of the diets compared to the control. Total tract apparent digestibility of OM tended to be lower (P = 0.08) for the DV XPC treatment while the total tract apparent OM digestibility for the Yeasture treatment was lower (P = 0.02) compared to the control. Total tract apparent CP digestibility followed the same trend, where the DV XPC tended (P = 0.05) to be lower while for the Yeasture treatment it was (P < 0.01) lower compared to the control. Total tract apparent aNDFom and starch digestibility was not affected by treatment and there was no effect of treatment on MCP flow from the rumen compared to the control. Blood plasma AA concentrations showed that the total EAA concentrations tended to be higher (P = 0.07) with the Yeasture compared to the control, and was mainly driven by an increase in threonine (P = 0.03), tryptophan (P = 0.02), valine (P = 0.08) and histidine (P = 0.06). Although total NEAA did not differ when Yeasture was fed compared to the control, there was an increase in concentrations of glycine (P = 0.04), asparagine (P = 0.03), tyrosine (P = 0.05), serine (P = 0.07), proline (P = 0.06) and taurine (P = 0.07). Feeding DV XPC had no impact on plasma concentrations of any AA.

Results suggest that there was no substantive impact of either yeast additive on rumen fermentation, mainly due to the lack of treatment impacts on aNDFom digestibility and MCP outflow, but suggest that a post ruminal effect occurred with Yeasture where GIT health was improved, as well as nutrient absorption efficiency, mainly due to the reduced total tract apparent digestion of CP and OM as well as increased plasma AA concentrations. This results shows that more research are needed on the effects of yeast based DFM's on post-ruminal digestive efficiency due, perhaps, to probiotic like effects of the components of the yeast products.