Research: Influence of diet on rumen Ochratoxin A degradation

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German research (University Bonn and Kiel) looked at ruminal Ochratoxin A degradation—Contribution of the different microbial populations and influence of diet.

The mycotoxin Ochratoxin A (OTA) is degraded extensively in the rumen. In this study, the relative contribution of different rumen microbial populations (MP) and the effect of diet on degradation of OTA were evaluated in a factorial design experiment.

Trial setup

Degradation of OTA was quantified by using the Hohenheim gas test (HGT) in vitro fermentation system. Five different HGT diets were used (concentrate:forage proportions (C:F) – 10:90, 30:70, 50:50, 70:30, 90:10), and donor animals were fed diets with the respective ratio.

Diets with the highest concentrate content were supplied with and without 10 g/kg sodium bicarbonate (70:30 BC and 90:10 BC).

The MP included whole rumen fluid, fungi + protozoa, bacteria + protozoa, protozoa and bacteria + fungi.

Protozoa numbers were counted after 24 h and OTA and Ochratoxin alpha (OTα) analysed at 0, 4, 8, 12, 24 h.

Area under the curve (AUC) and half-life were calculated for the latter two.

Results

The short average OTA half-life for whole rumen fluid of 2.6 h (1.3–4.5 h) demonstrates the high OTA degradation capacity of the rumen MP (i.e., standard HGT inoculum) and corresponds well with published in vivo results.

Both MP and diet affected OTA degradation.

Interactions among factors occurred, which made it necessary to do further comparisons within factor levels.

Among MP, those with bacteria (bacteria + fungi and bacteria + protozoa) had lower AUC values for OTA (196–673 ng/ml h), meaning higher degradation capacity, than those without bacteria (fungi + protozoa and protozoa; 701–1206 ng/ml h).

Whole rumen fluid had the lowest AUC values (146–249 ng/ml h).

Diet had a quadratic effect on protozoal numbers with minimum values for the lowest and highest C:F ratios, for bacteria + protozoa, fungi + protozoa and protozoa, but no corresponding effect was found for OTA degradation parameters.

While the generally high capacity to degrade OTA was confirmed, results for the contribution of different microbial groups shed new light on ruminal OTA degradation.