Effect of Turboviv phytochemicals on soybean meal protein degradation using in vitro method

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W102 Effect of Turboviv phytochemicals on soybean meal protein degradation using in vitro method. V. Ballard*[1], F. Robert[1], M. Mireaux[1], and A. Boudon[2], [1]*Groupe CCPA*, *Janzé, France*, [2]*INRAE, Agrocampus Ouest, PEGASE*, *Saint-Gilles, France*.

Phytochemicals are known to improve the proportion of diet proteins by-passing the rumen, by binding proteins and limiting their ruminal degradation. This can improve milk yield and milk protein synthesis. The objective of this study was to evaluate the effects of dietary phytochemicals [Turboviv; CCPA, Janze, France] as rumen modifiers on protein degradation with the Ankom Daisy Incubator II System. Three lactating fistulated dairy cows were used for rumen fluid collection in 3 studies. Animals were fed with diets, based on either corn silage or pasture. In each study, rumen fluid was collected at the beginning for control. Then cows were fed during 21 d with phytochemicals, before the 2nd rumen fluid collection (Turboviv treatment). Dry matter (DM, 17 h at 103°C) degradation was determined with samples of alfalfa and soybean meal (46% CP) incubated in a Daisy Incubator II in bags with rumen buffer and rumen fluid for 0, 2, 7, 24, and 48 h. Nitrogen content of the residues (Kjeldahl) was also analyzed for soybean meal. Means were compared within feeds (alfalfa or soybean meal), using GLM function with R considering diets (corn silage or grass), treatments (Control or Turboviv), incubation times and interactions as factors (significance at $P < 0.05$). Turboviv decreased DM degradability of both alfalfa and soybean meal ($P < 0.05$) in rumen fluid related to both diets. The decrease was observed at 2 and 4 h hours of incubation for soybean meal (interaction time × treatments, $P < 0.01$). Turboviv also decreased the protein degradability for soybean meal at 2h and 4h (respectively 4.0% and 10.4%, Table 1). Summary statistics of protein degradation are given in the Table 1. These data suggest that feeding Turboviv can significantly affect rumen fermentation, and more specifically can decrease ruminal protein degradation.

Table 1 (Abstr. W102). Summary statistics of soybean meal protein degradation (%)

	2 h		4 h		7 h		24 h	
Group	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control	40.8	1.6	54.8	5.9	62.3	8.5	98.1	1.0
Turboviv	36.8	2.4	44.4	5.0	55.7	3.4	97.5	0.9

Key Words: dairy cow, phytochemicals, ruminal degradability of protein

W103 Lactational performance of dairy cows supplemented with *N*-acetyl-L-methionine. S. E. Räisänen*[1], X. Zhu[2,3], C. F. A. Lage[1], M. E. Fetter[1], H. A. Stefenoni[1], A. Melgar[1], D. E. Wasson[1], S. F. Welchez[1], J. S. Eun[4], J. Park[4], and A. N. Hristov[1], [1]*The Pennsylvania State University*, *University Park, PA*, [2]*Institute of Subtropical Agriculture, Chinese Academy of Sciences*, *Changsha, Hunan, China*, [3]*University of Chinese Academy of Sciences*, *Beijing, China*, [4]*Institute of Biotechnology, CJ Blossom Park*, *Suwon, Korea*.

The objective of this experiment was to determine the effect of *N*-acetyl-L-methionine (NALM) on milk production and milk composition in lactating dairy cows fed a diet that meets or exceeds the requirements for energy and metabolizable protein (MP) but is deficient in digestible Met (dMet), according to NRC (2001). Eighteen multiparous Holstein cows [60 ± 1.5 d in milk, 638 ± 15 kg BW, 52.8 ± 2.98 kg milk yield (MY)] were used in a replicated 3 × 3 Latin square design experiment with three 28-d periods, balanced for residual effects. Treatments were (1) basal diet supplying 1.66% digestible (d)Met (CON), (2) basal diet supplemented with 32 g/d NALM (NLow), (3) basal diet supplemented with 56 g/d NALM (NHigh). The NALM treatments supplied estimated 16.7 and 29 g/d dMet, respectively. The NALM was top-dressed on the basal diet at morning feeding. Dry matter intake (DMI) and MY were recorded daily, and milk sampling was performed on the last week of each experimental period from 4 consecutive milkings (2, AM and 2, PM). Data were analyzed using PROC MIXED of SAS with treatment and period in the model. Square and cow within square were random effects. Linear effects of NALM dose were tested. Dry matter intake was similar ($P = 0.76$) among treatments (averaging 24.7 kg/d; SEM = 0.72). Milk yield was also not affected ($P = 0.64$) by treatment (averaging 50.7 kg/d; SEM = 1.56), whereas ECM was decreased linearly ($P = 0.03$) by NALM (48.1, 45.1 and 45.0 kg/d, respectively) as a result of a linear decrease ($P = 0.004$) in milk fat concentration (3.77, 3.47, 3.33%, CON, NLow, and NHigh, respectively). Similarly, there was a linear decrease ($P = 0.007$) in milk fat yield with increasing NALM dose: 1.92, 1.74, and 1.69 kg/d for CON, NLow, and NHigh, respectively. The concentration and yield of both lactose and milk true protein were not affected by treatment ($P > 0.10$). In the conditions of this experiment, supplementing NALM to an MP-adequate diet supplying dMet at 1.66% of MP caused a decrease in milk fat and ECM yield and did not affect milk or milk true protein yields in mid-lactation dairy cows.

Key Words: *N*-acetyl-L-methionine, milk production, dairy cattle

W104 Treatment of soybean meal to improve protein utilization by dairy cows. A. Klop[1], M. Aoun[2], J. Ricaud[2], and G. van Duinkerken*[1], [1]*Wageningen Livestock Research*, *Wageningen, the Netherlands*, [2]*Idena*, *Sautron, France*.

Soybean meal is a common protein source in dairy cattle diets. By chemical treatment (e.g., with formaldehyde), rumen degradable protein content can be decreased, while increasing ileal digestible protein content. We evauated whether feed additive Vertan (a blend of eugenol, thymol and essentials oils) can be a nature-based alternative for chemical processing of soybean meal. To evaluate the effect of Vertan on performance and nitrogen use efficiency, a feeding trial was conducted with 3 groups of 15 dairy cows each. After a pre-period, cows were grouped and allotted to a treatment: a negative control diet (SBM) with soybean meal (1.4 kg DM/cow/d), a positive control diet (SBM-bp) with formaldehyde treated soybean meal (1.2 kg DM/cow/d) and a treatment diet (SBM-V) with soybean meal supplemented with Vertan (1.4 kg DM/cow/d). Crude protein content of all diets was 15% on a dry matter basis. Parallel to this study, 3 cows fitted with a rumen cannula were used in a Latin square design to measure rumen fermentation characteristics, in situ rumen degradation of the diet and digestion. Total dry matter intake of cows in the performance trial was 22.6 kg/cow/d for all treatments. Milk yield did not differ between treatments. Milk protein content was lower ($P = 0.037$) for SBM-bp (35.7 g/kg) compared with SBM (36.4 g/kg). Blood urea of cows on SBM-V was lower (3.4 mmol/L) ($P = 0.002$) compared with cows on SBM (3.9 mmol/L). Blood urea differences in the performance trial were in accordance with the differences in rumen ammonia concentrations found in the parallel trial with cannulated cows. Ammonia concentration in rumen fluid tended ($P = 0.073$) to be lower for treatments SBM-V (6.9 mmol/L) and SBM-bp (7.0 mmol/L) compared with SBM (9.1 mmol/L). The total VFA concentration in rumen fluid was highest ($P = 0.014$) for SBM (117.5 mmol/L) compared with SBM-bp (101.5 mmol/L) and SBM-V (104.7 mmol/L). Rumen pH tended ($P = 0.055$) to be higher for SBM-bp (6.25) compared with SBM (6.14) and SBM-V (6.18). Apparent total-tract digestibility did not differ between treatments, Vertan had no effect on DM, CP, NDF and starch digestibility. We concluded that the use of Vertan affects rumen protein fermentation, resulting in lower rumen ammonia and blood urea.

Key Words: protein, nitrogen, utilization

W105 Evaluation of an underivatized compared with a derivatized method to quantify bovine plasma amino acids via liquid chromatography electrospray mass spectrometry. M. Z. Toledo*[1],