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Methods assessment of self-tanning of a rapeseed meal fraction enriched in proteins and phenolic compounds

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As part of a research program aiming at developing new value chains from rapeseed meal (RSM) production (in partnership with the SAS PIVERT, Compiègne France), two protein tanning methods (T4 and T50) have been assessed to contribute to the withdrawal of formaldehyde as a tanning agent in the treatment of RSM for feeding ruminants.

Material and methods

- ❖ Tested material: fraction of milled RSM collected at the positive electrode of an electrostatic separator (Laguna, O., et al., 2018. Production of proteins and phenolic compounds enriched fractions from rapeseed and sunflower meals by dry fractionation processes. Industrial Crops and Products. 118: 160-72)
- ❖ Treatment T4: RSM fraction:water mixture (1:10, w:w) incubated at pH 9.0 for >48h at 4°C
- ❖ Treatment T50: RSM fraction:water mixture (1:2, w:w) incubated for 48h at 50°C
- ❖ 24h fermentations in 72 mL culture tubes inoculated with rumen microbiota and maintained on nitrogen-free energy sources (60 mg cellulose + 40 mg starch per tube) and 50 mg of untreated, T4 or T50 RSM fractions (proteins: 0.59 g/g Delip.DM, Total phenolic compounds : 26 mg/g Delip.DM)
- ❖ NH₃ net production + acetate, propionate and butyrate productions per tube



	HF	Acetate	Propionate	Butyrate	NH ₃
	μmoles	Moles/100 moles HF			mg
Source	Probability Pr>F				
RSM fraction	0.11	0.93	0.80	0.76	0.01
Inoculum	0.26	0.07	0.02	0.04	0.01
	Means per RSM fraction (N=3)				
T4	446	91.5	63.3	22.6	-0.622 †
T50	517	90.7	65.8	21.8	-0.194
Untreated	499	91.4	65.6	21.5	-0.339

The RSM fractions did not alter the fermentation yield (**HF**: amount of fermented hexoses) nor its pattern (specific productions of short-chain fatty acids in moles /100 moles HF). The amount of ATP available for biomass synthesis was thus not significantly affected by the nature of RSM fraction.

The net production of ammonia was the balance between RSM amino acids deamination and protein synthesis by microbes. It was significantly reduced by T4 († P<0,05).

T4 appeared to reduce the deamination of amino acids of RSM origin rather than increase the uptake of ammonia for microbial protein synthesis, saving about 8% of RSM digestible proteins in the rumen. Additional microscopic observation and electrophoresis will assess if that this partial self-tanning stemmed from an aggregation of RSM proteins rather than coacervation.