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Abstract

Microplastics (MPs) enter the animal digestive system through contaminated feeds [1, 2] creating a unique interface between the rumen and microbiota, resulting in MPs degradation [2-4]. This study investigated the interaction between polyethylene terephthalate (PET) and ruminal activity to understand its influence on feed degradation and fermentation processes.

The experiment was conducted using an *in vitro* gas production (GP) system with lamb rumen fluid and buffer solution to evaluate the effects of different doses of PET contamination (0, 0.6, 1.2, 1.8% dry matter of feed) in 200 mg of concentrate on: pH; GP at different times (at 0, 2, 4, 6, 12, 24, 48, 72 and 96 hours); rumen ammonia-nitrogen (NH_3-N); dry and organic matter degradability (DMD, OMD); rumen protozoa; and microbial efficiency (PF). The experiment was triplicated and repeated over three consecutive weeks.

Table 1. Effects of PET contamination in feed on the *in vitro* ruminal activity.

PET %	pH	NH_3-N mg/100mL	DMD mg/g	OMD mg/g	Protozoa 10^5/mL	PF
0	6.54	24.90^{b}	671.9^{a}	721.2^{a}	4.38^{a}	2.272^{a}
0.6	6.56	25.51^{ab}	666.8^{ab}	712.1^{ab}	4.18^{a}	2.164^{b}
1.2	6.56	25.70^{a}	652.7^{bc}	697.7^{bc}	4.24^{a}	2.077^{c}
1.8	6.53	26.56^{a}	644.4^{c}	688.3^{c}	3.87^{b}	2.057^{c}
SEM	0.041	1.022	9.36	9.99	0.235	0.0392

$^{a-c}$ Within a column, different superscripts differ significantly ($P < 0.05$).

The presence of PET in concentrate feed within the lamb ruminal environment negatively affected degradability and fermentative processes, particularly at the highest dose. Compared to the control feed without PET addition, PET decreased DMD, OMD, ruminal protozoa, and PF (Table 1), while it increased ruminal GP (Figure 1) and NH_3-N.

The study demonstrated an interaction between PET and ruminal microbiota. These findings highlight the potential adverse impacts of PET on the ruminal fermentation and feed degradability. Further research is needed to explore the effect of PET on gastrointestinal activity and to develop strategies to mitigate the adverse effects.

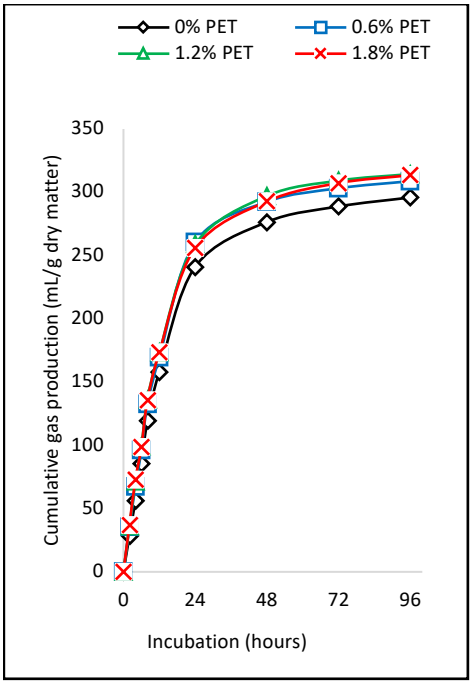

Figure1. Effect of PET on the *in vitro* GP.

References

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