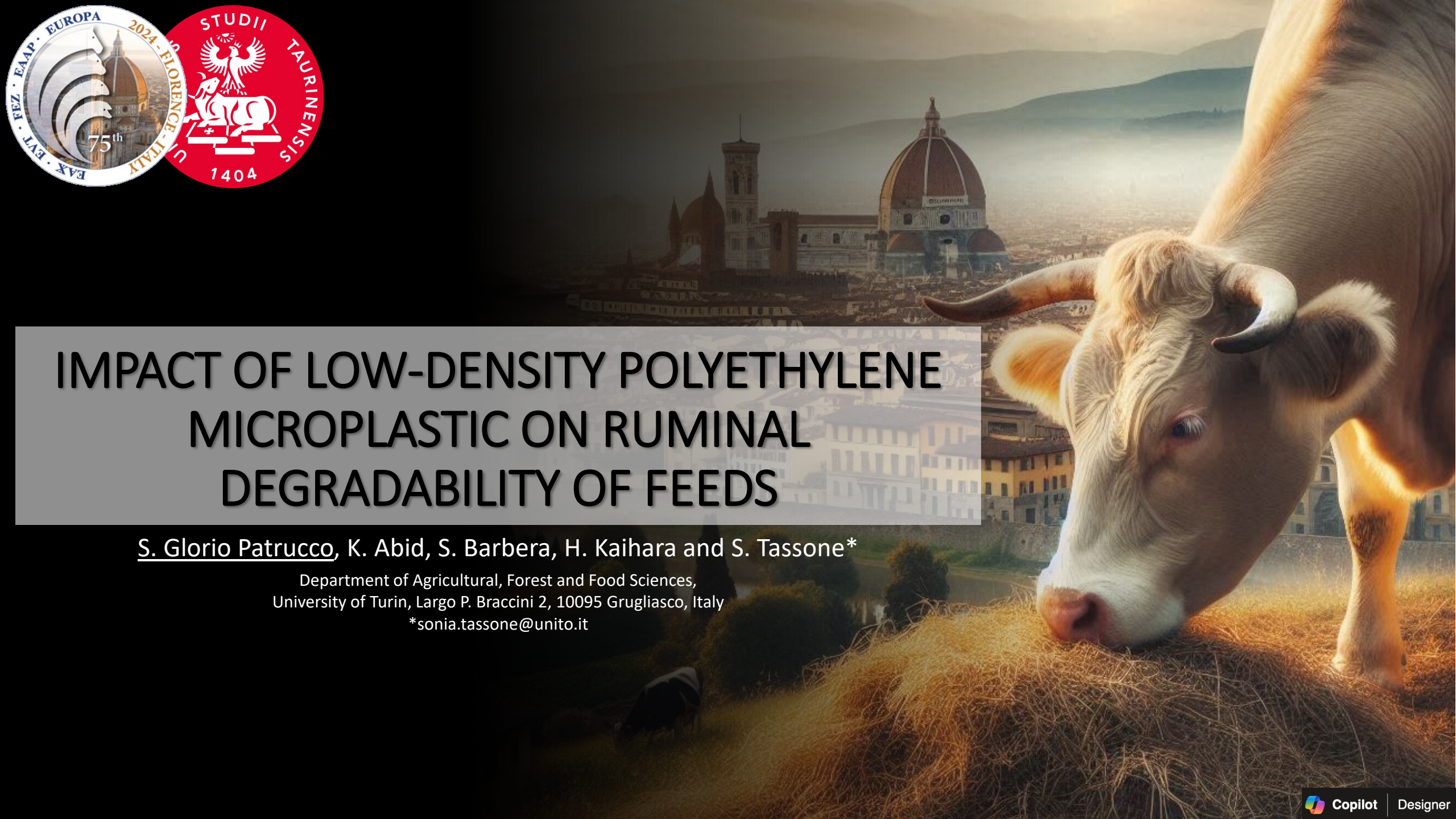

IMPACT OF LOW-DENSITY POLYETHYLENE MICROPLASTIC ON RUMINAL DEGRADABILITY OF FEEDS

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- **Plastics** are intensively used in farms, particularly **to store feeds**[1]
- **10.3 kg of plastic per cow** is yearly employed in North Italy[2]
- **50-60 % of foreign bodies** found in the rumen of slaughtered **cattle** are **plastic**[3]
- The plastic mainly applied in farms is **low-density polyethylene (LDPE)**[1,2]
- **LDPE** is utilized to **cover horizontal silos** and to **wrap hay bales**[1,2]

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- **Plastics undergo fragmentation** driven mainly by UV radiation and mechanical abrasion, **generating microplastics (MPs) (from 1 µm to 5 mm)**[4]
- **MPs** were **detected** in **ruminant feeds**: corn silage, concentrate, hay and total mixed ration[5,6]
- The main MP polymer found in ruminant feeds was **LDPE**[5,6]
- Up to now no **work** has investigated the **impact of LDPE MPs** on **ruminal degradability of feeds**

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The aim of this research was to study the impact of **LDPE MPs** on *in vitro* ruminal degradability of 3 feeds: mixed hay, corn silage, and concentrate

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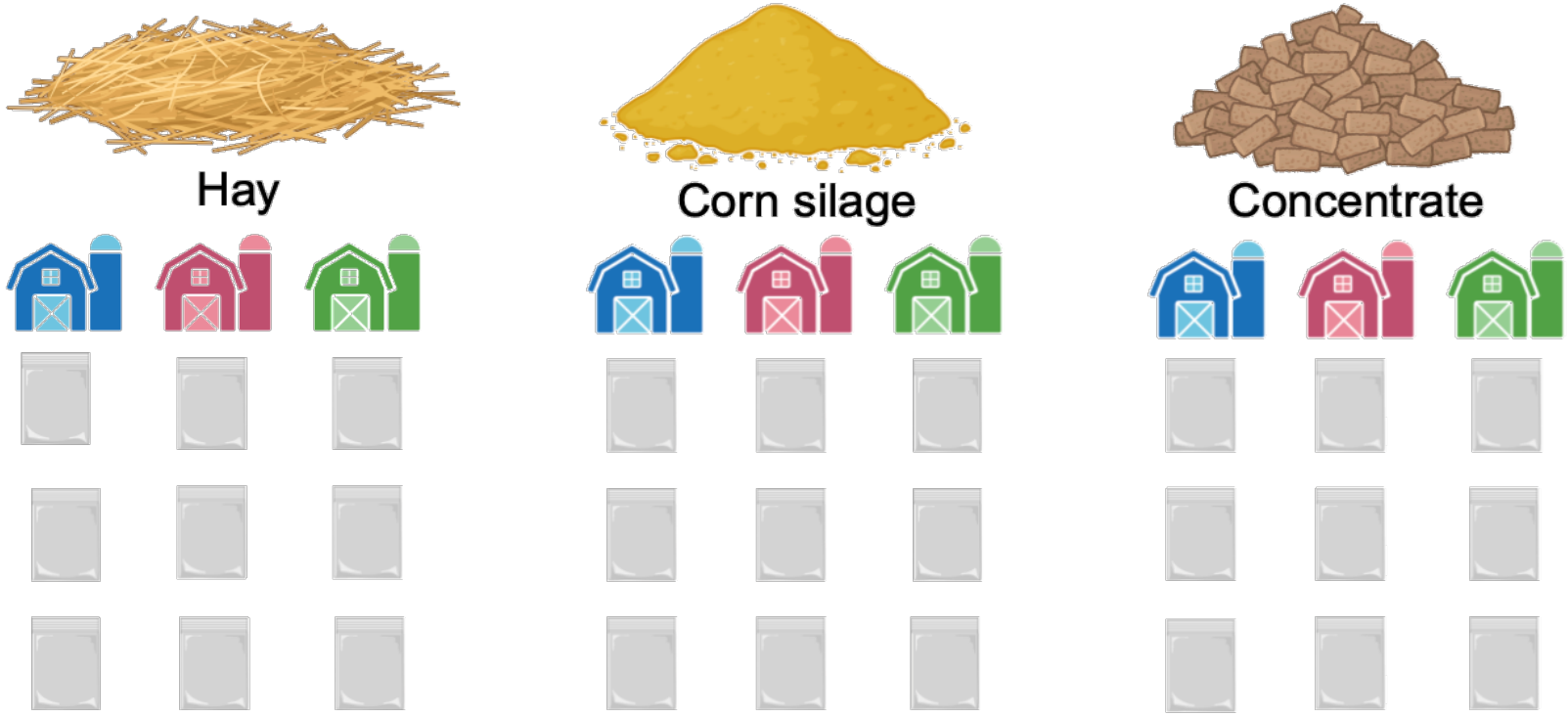
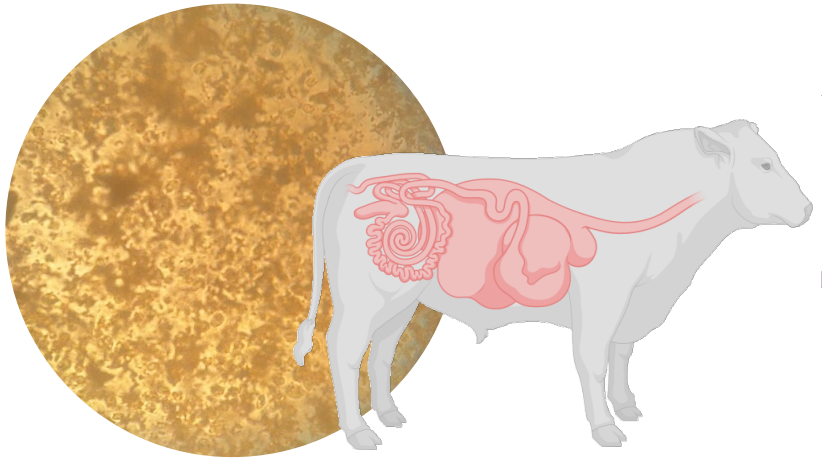
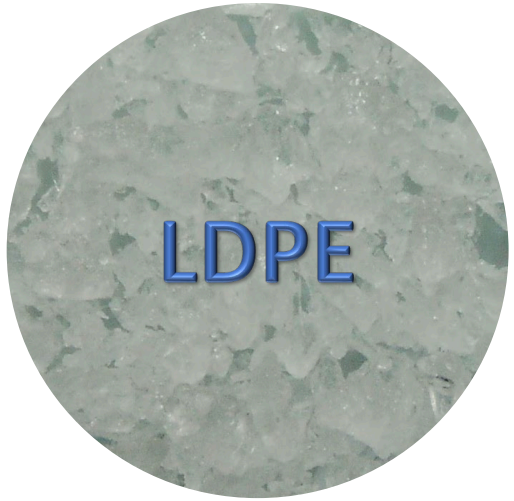
Feed samples were collected from **3 farms** located in N-W Italy, dried at 60 °C for 24 h, ground (1 mm sieve) and weighed (0.5 g) in F57 Ankom bags (x3)



- **Rumen fluid** was collected in a slaughterhouse from 3 healthy Piedmontese bulls[7]



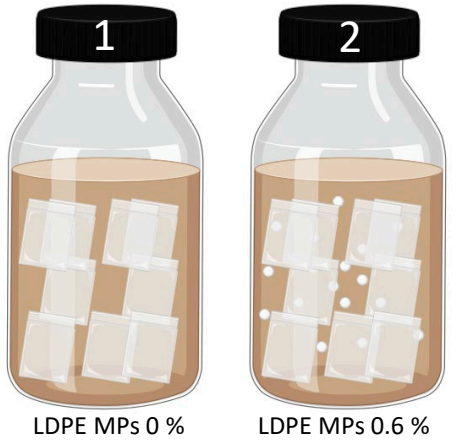
- **LDPE MPs** were provided by an Italian company



- **Four jars** were incubated for **48 h** in the **Ankom Daisy^{II}.** Each jar contained 400 mL of filtered rumen fluid, 1600 mL of buffer solutions[8] and **27 F57 Ankom bags** (3 for each feed and each farm). The experiment was conducted for **3 RUNS**
- **LDPE MPs** were added in each jar at different concentrations (% m/V): **0 % (jar 1)**, **0.6 % (jar 2)**, **1.2 % (jar 3)** and **1.8 % (jar 4)** of buffered rumen fluid
- **Ruminal degradability** (D %) was calculated as:

$$\mathrm{D}\ \% = \left(\frac{Pre\ inc.\ feed\ weight - Post\ inc.\ feed\ weight}{Pre\ inc.\ feed\ weight}\right) x\ 100$$

- All the data were statistically analysed using a one-way analysis of variance (ANOVA) with PROC GLM of the SAS software (version 9.1; SAS Institute, Cary, NC, USA) (n = 27, p-value < 0.05)



LDPE MPs 0 % LDPE MPs 0.6 %
LDPE MPs 1.2 % LDPE MPs 1.8 %

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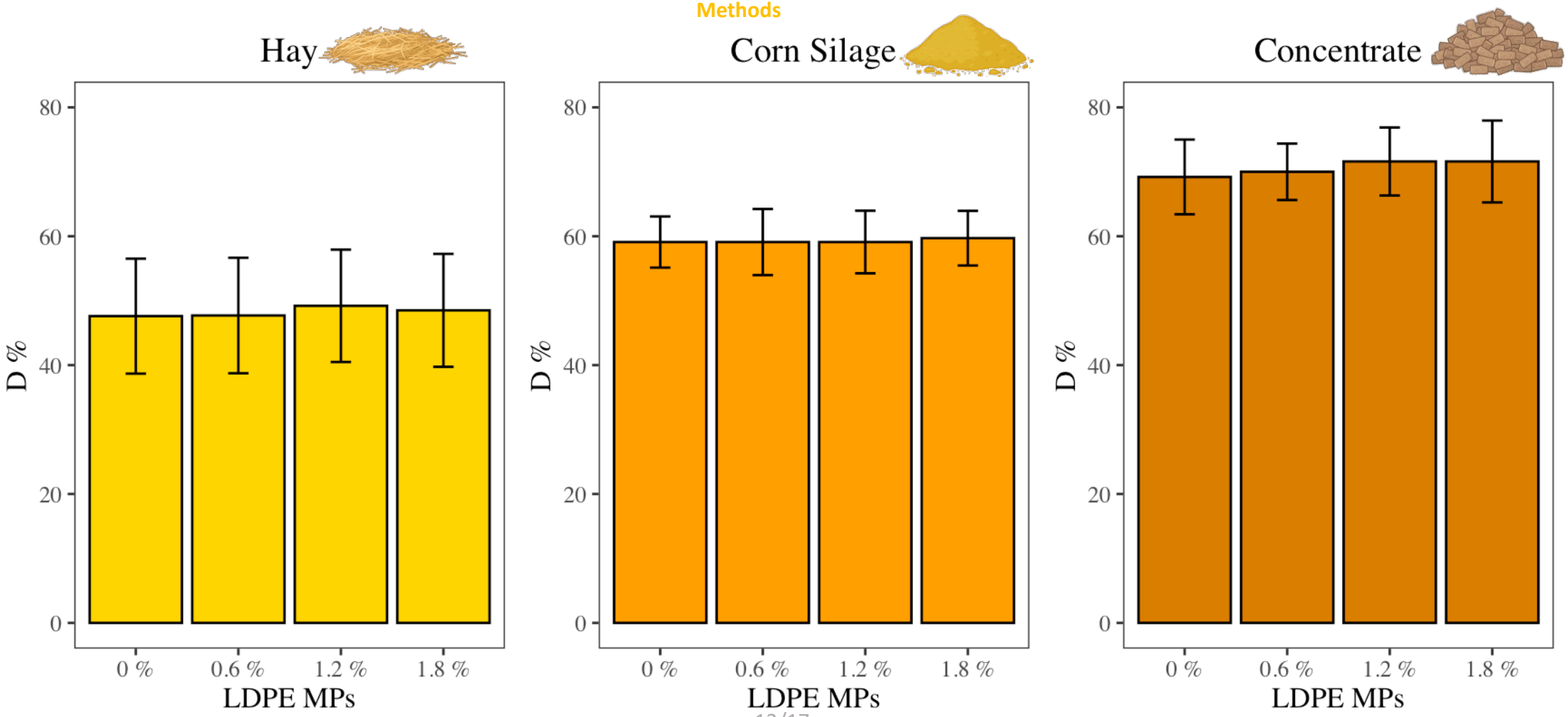
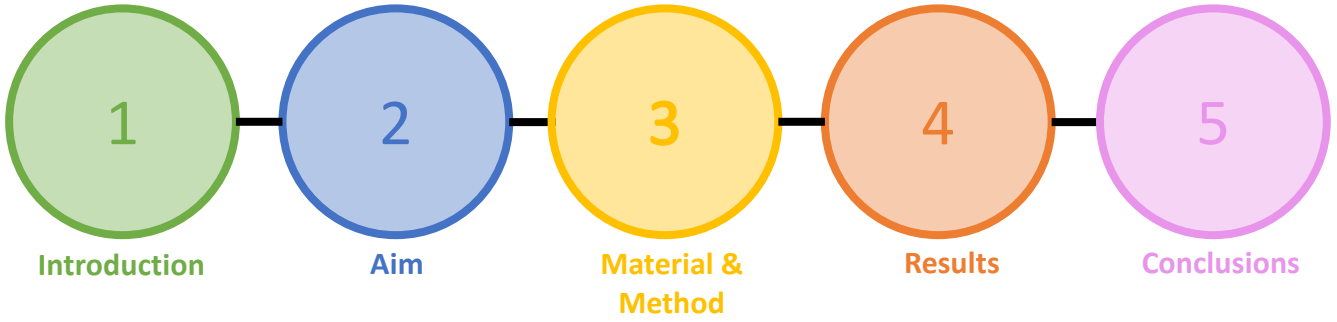

Hay
Corn Silage
Concentrate
D %
80
60
40
20
0
0 %
0.6 %
1.2 %
1.8 %
LDPE MPs



- **Ruminal degradability** of **mixed hay**, **corn silage** and **concentrate was not affected by LDPE MPs** at the concentrations 0.6 %, 1.2 % and 1.8 % of buffered rumen fluid
- Although unexpected, these results provide valuable insights into the **resilience of the rumen degradation process** in the face of exposure to **LDPE MPs**
- Future studies are needed to further investigate the impact of **LDPE MPs on the digestive system** including additional parameters such as **ruminal degradability of Neutral Detergent Fiber**, **Acid Detergent Fiber**, and **Crude Protein** as well as **intestinal digestibility**. Moreover, examining the effects of **other MP polymers** is essential to gain a deeper understanding of the impacts of **MPs pollution on ruminant nutrition**

Thank you for your attention

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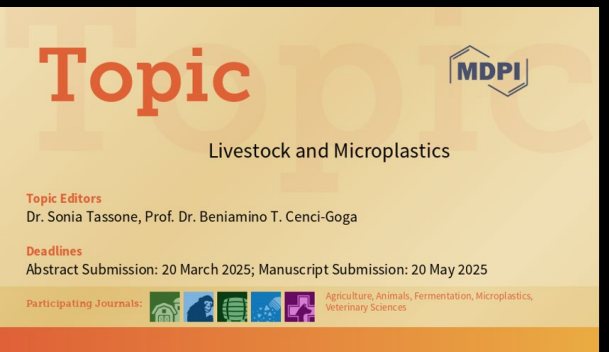

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