

## ***In vitro* gas production of hydroponic green forage from corn, oat, and barley seed**

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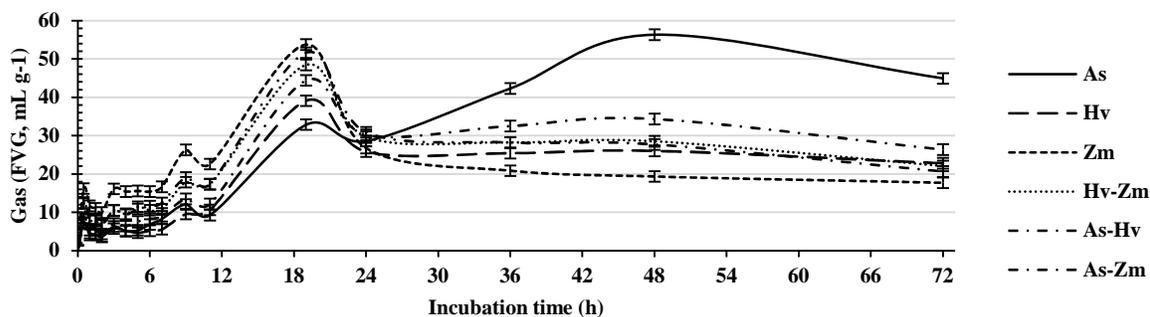
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Hydroponic green forage (HGF) represents a good alternative in ruminant nutrition (Gallegos Rivero and Daim, 2017). Cereals such as barley, corn, oats, wheat, and sorghum, have been used individually to produce HGF (Kumar *et al.* 2018). Bromatological composition of the HGF varies according to the cereal used and affects the rumen fermentation pattern (Naik *et al.*, 2015), so the fermentation pattern of HGF obtained from cereal mixtures may be different from that obtained from cereals alone. The objective of this study was to determine the kinetic of *In vitro* gas production of HGF produced from cereals alone (corn [*Zea mays*, Zm], barley [*Hordeum vulgare*, Hv] and oats [*Avena sativa*, As]), or mixed (Zm-Hv, Zm-As and Hv-As, 1 to 1 ratio).

A 500 mg HGF sample (harvested at 14 days of age, dehydrated at 65 °C and ground to 1 mm particle size) was incubated with 40 mL of culture medium at 39 °C for 72 h. We measured the fractional gas volume (FGV, mL g<sup>-1</sup> DM), maximum volume (V, mL g<sup>-1</sup> MS), production rate (S, h<sup>-1</sup>) and delay time (L, h). The experimental design was completely randomized with repeated measures and six independent repetitions per treatment (PROC MIXED, SAS®). Parameters of gas production kinetic (V, S and L) were obtained using a logistic model.

The FVG was higher with Zm and its mixes, and lower with As, Hv and As-Hv, in the first 24 h of incubation (p 0.05). From 36 h, the FVG was higher with As and As-Hv, and lower with Zm (p 0.05). Kinetic parameters, V, S and L, were different between substrates (p 0.05). The V parameter was higher with Zm (284.4 mL), As (271.5 mL) and Zm-As (261.7 mL). The S parameter was higher with Zm (0.060 h<sup>-1</sup>) and lower with As (0.023 h<sup>-1</sup>). Finally, L parameter was higher with As (3.80 h) and lower with Zm (0.18 h).



**Figure 1. Fractional gas volume (FGV) obtained from *in vitro* fermentation of hydroponic green forage cereals alone (corn [*Zea mays*, Zm], barley [*Hordeum vulgare*, Hv] and oats [*Avena sativa*, As]), or mixed (Zm-Hv, Zm-As and Hv-As).**

*In vitro* fermentation was higher during the first 24 hours in Zm HGF alone and mixed with As and Hv, but after 36 hours it was higher with As alone. Differences in gas production pattern are due the content of non-structural and structural carbohydrate in sprouted seed (Fazaeli *et al.*, 2012). In this study, the content of NDF was of 32.2, 58.5 and 58.0% in corn, oat and barley. The HGF from cereals mixed maintain a stable fermentation and represent an option to provide high-quality substrates in ruminant nutrition.

### **References**

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