

Effect of Differences in Forage Quality on Methane Production and Ruminant Fermentation Characteristics of Hanwoo Steers

Yang Won Woo¹, Chang Hyun Lee², Bharanidharan Rajaraman² and Kyoung Hoon Kim^{1,2}

¹ Graduate School of International Agricultural Technology, Seoul National University, Republic of Korea

² Green Bio Science and Technology, Seoul National University, Republic of Korea

ABSTRACT

The purpose of this experiment is to determine CH₄ production and ruminal characteristics for different quality of forages. Four Hanwoo (Korean native beef cattle) steers (initial body weight, 374 ± 40 kg) were used in a duplicated 2 × 2 Latin square design and fed either lacerated rice straw (RS) ad libitum plus 3.2kg of concentrate/d or lacerated Italian ryegrass (IRG) silage (dry matter 58.5%) ad libitum plus 3.2kg of concentrate/d. CH₄ production was measured using four confinement-type respiration chambers for two consecutive days. Rumen fluid was collected before feeding and after 1.5 and 3 h after feeding. The average OM, CP and NDF intake for steers fed IRG was around 10% (P = 0.086), 19% (P = 0.059) and 30% (P = 0.038) higher than those for steers fed RS, respectively. There were no statistically differences in CH₄ production (g/d) and conversion rate (%) for steers fed IRG and RS even though indirect estimates of apparent OM and NDF digestibility (g/kg DM) of IRG (0.674 and 0.635, respectively) also were higher (P = 0.009) than those of RS (0.614 and 0.557, respectively). However, CH₄ production per digested NDF (g/kg DM) for steers fed rice straw showed higher trend (35 vs 30.5; P = 0.07) compared with those for steers fed IRG. No differences were observed in total VFA and C2/C3 between treatments. Proportions of isobutyrate and isovalerate were higher (P = 0.003 and P = 0.012, respectively) for steers fed IRG than those for RS. We concluded that the laceration of forage by a TMR mixer might reduce the impact of different forage quality on CH₄ production. Therefore, further studies are required to establish the role of physical and mechanical properties when comparing the effect of different forage qualities on ruminal methane production.

Keywords: Forage quality, Italian ryegrass, Methane, Rice straw, Ruminant fermentation