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Palatability Test on Rice Straw, Grass, and Sorghum Silage for Cattle in Cambodia

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ABSTRACT: Feed is a constraint of cattle production in Cambodia. Rice straw, fresh grass, and sorghum silage were used to assess palatability for cattle feeding. Five cattle were used for the palatability test over seven days. The results showed the feed intake of fresh grass was greater than rice straw or sorghum silage. No difference in preference index between the rice straw and sorghum silage for the amount of feed intake. Sorghum silage can be used to improve cattle production in Cambodia as an alternative to rice straws.

Keywords: Cambodia cattle, feed, growth, livestock.

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INTRODUCTION

Feed is a primary constraint for increasing cattle production in Cambodia. Climatic variability and arable land devoted primarily to rice production cause the feed shortage. Rice straw used as feed provides fibrous fodder but limits the nutritional value of cattle; low in protein and high in crude fiber (Pham et al., 2015; Devendra and Leng, 2011). Cattle growth and body condition, reproduction, productivity, and increased susceptibility to disease can be caused by low nutrition feed (Young et al., 2013). Cattle growth and body condition, reproduction, productivity, and increased susceptibility to disease can be caused by low nutrition (Young et al., 2013). Corn stover silage can be used as an alternative to rice straw for cattle feed in Cambodia (Chea et al., 2015). Commercial cattle production has been promoted to meet local meat demand (MAFF, 2015). The animal feed industry is one of the most important sectors to be developed to encourage the scaling-up of cattle production and productivity. The objective of this study was to assess the palatability of rice straw, fresh grass, and sorghum silage for cattle feeding.

MATERIALS AND METHODS

Two females and three males of five cattle ages 9 to 60 months old were selected for the palatability test (Table 1) for three different feeds, including rice straw, fresh grass, and sorghum silage. Data on the nutrient contents of feed fed to cows in the experiment are presented in Table 2.

Table 1. Characteristics of cattle involved in the palatability test and amount of each feed type included rice straw, fresh grass, and sorghum silage.

No.	Age (month)	Sex	Rice straw (kg)	Fresh grass (kg)	Sorghum silage (kg)
1	60	F	0.8	2.0	2.8
2	17	F	0.8	2.0	2.8
3	24	M	0.8	2.0	2.8
4	15	M	0.8	2.0	2.8
5	9	M	0.8	2.0	2.8

Table 2. Nutrient contents of rice straw, fresh grass, and sorghum silage were used in this study

Forage	Dry matter (%)	Moisture (%)	Crude protein (%)	Crude ash (%)	Crude fiber (%)	Crude fat (%)	pH	ME (kcal /kg)
Sorghum silage	21.8	78.2	11.7	2.53	34.6	1.24	4.01	1,921
Local grass	27.9	72.1	8.3	3.70	38.1	1.20	NA	1,490
Rice straw	91.0	8.98	3.5	9.87	36.7	1.33	NA	733

The test was performed for seven days from 23th to March 28, 2019; each feed was put in a black plastic container (Fig. 1) with amounts described in Table 1. Three feed types were left for individual cattle twice per day, in the morning, typically between 08:30 and 09:30, and in the afternoon, typically between 14:30 and 15:30.

Fig. 1. Cattle used for the palatability test over seven days, with rice straw, fresh grass, and sorghum silage

Daily feed intake (FI) was measured following the equation as $FI = FG - FR$; where FG = amount of feed given (kg) and FR = amount of feed residual (kg). The relative preference index, or RPI, was calculated by dividing feed intake by the highest feed intake and expressing the result as a percentage (Okoruwa, 2019). The result is then classified into three categories: high (> 60%), medium (35-55%), and low palatability (25 percent. Analysis of variance (ANOVA) followed by the Kruskal-Wallis test was used to test a different FI mean among the three different feed types. A higher amount of FI indicates a better preference. Pearson's correlation was applied to visualize the correlation between body weight and feed intake of the three different feed types.

The Relative Preference Index (RPI) was calculated by dividing total feed consumption by the highest intake and expressing the result as a percentage (Okoruwa, 2019). The result is then classified and divided into three categories: high (> 60%), medium (35-55%), and low palatability (25 percent). The 'ggplot2' R package (Wickham, 2011) was used for statistical analyses with the R software, version 3.3.3 (R Core Team, 2017).

RESULTS AND DISCUSSION

The feed intake of cattle showed similarities between the morning test (Fig. 2) and afternoon test (Fig. 3), whereas the sorghum silage was consumed more after the fifth day of the test till similar amount between the fresh grass and sorghum silage at the end of the test; indicated that cattle could get used to eating sorghum silage less than a week. Among the fresh grass, sorghum silage, and rice straw, cattle preferred the fresh grass greater than sorghum silage and rice straw (Fig. 4).

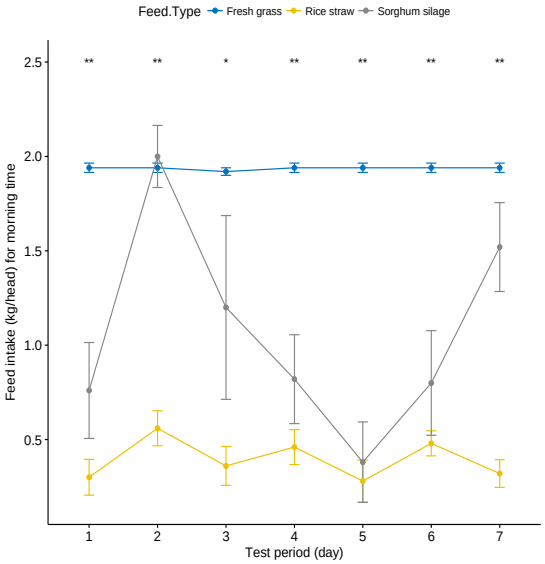

Fig. 2. Average daily feed intake of three different feed types fed by cattle of three other groups of Fresh grass, Sorghum silage, and Rice straw in the morning (between 08:30 and 09:30).

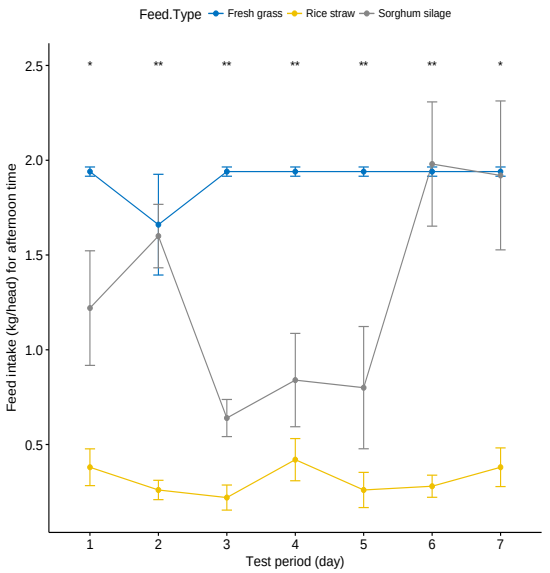

Fig. 3. Average daily feed intake of three different feed types fed by cattle of three other groups of Fresh grass, Sorghum silage, and Rice straw in the afternoon (between 14:30 and 15:30).

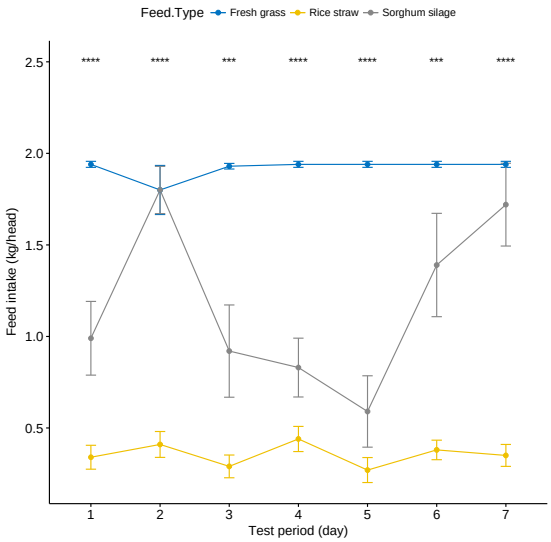

Fig. 4. Average daily feed intake of three different feed types fed by cattle in three other groups Fresh grass, Sorghum silage, and Rice straw.

For the amount of feed intake, Fresh grass was most significant, followed by Sorghum silage and Rice straw (Fig. 5). The amount of feed intake was not related to the body weight for Fresh grass or Rice straw, whereas it was positively weak correlated to body weight for sorghum silage (P = 0.079; Cor = 0.211), suggesting that larger or older cattle seem to be preferred sorghum silage more than those were smaller or younger.

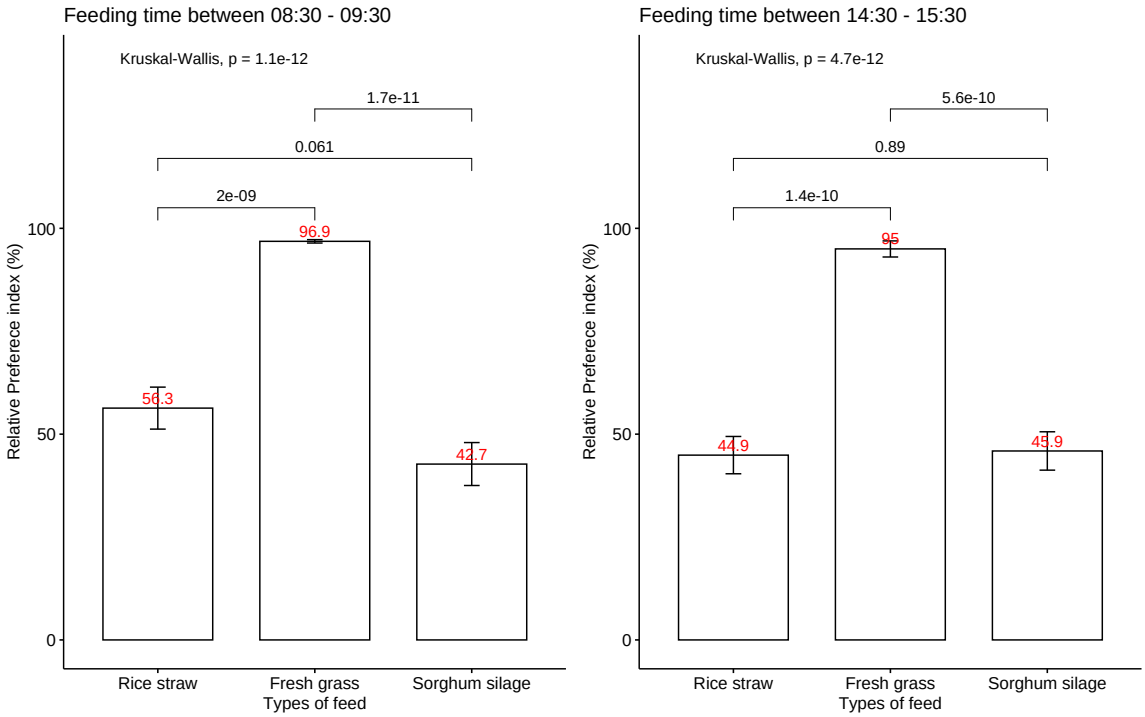

Fig. 5. Cattle's relative preference index for three different groups of fresh grass, sorghum silage, and rice straw in the morning (08:30 and 09:30) and afternoon (14:30 and 15:30).

There were noticeable differences in the relative preference index in the morning or afternoon feeding between the three types of feeds. RPI of goats offered fresh grass is highest compared with other feeds. The fresh grass is categorized as having high palatability; it could be due to familiarity with the fresh grass compared to newly introduced sorghum silage and rice straw (Obour, 2015. Interestingly, cattle with five days of the sorghum silage experience showed medium palatability (Okoruwa, 2019). Feeding experience has been shown to affect subsequent preference (Parsons et al., 1994).

CONCLUSION

The palatability test indicated that sorghum silage could be used for aged cattle and body condition. These findings provide good options for improving the livestock sector in Cambodia.

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