

EFFECTS OF LIGHT-DARK(1L-1D, 2L-2D, 3L-3D) CYCLES ON RUMINATING AND MASTICATING BEHAVIORS OF GOATS

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Introduction

Gordon and McAllister (1970) reported that sheep exposed to an 8 h alternating cycle of light and dark showed no adaptation to a 16 h 'day' and their behaviors were circadian. These workers suggested the involvement of external cues to the experimental room in this circadian rhythm. The present experiment was planned to clarify the behaviors of rumination and mastication of goats under the diurnal conditions of light(L)-dark(D) cycle(1L-1D: 1 h, 2L-2D: 2 h and 3L-3D: 3 h alternating cycles).

Materials and Methods

Three female goats, crossbreeds of the Saanen x native goat weighing 42.5 ± 1.6 kg and fed continuously, were exposed for 24 hours to the lighting system of 1L-1D cycle(Exp.1), 2L-2D cycle(Exp.2) and 3L-3D cycle(Exp.3). The jaw movements of the animals were recorded continuously for 4 days by an automatic counter system. The results were analyzed into three components: rumination, rest and mastication.

Results and Discussion

TABLE 1. RUMINATING AND MASTICATING TIME IN EXP.1(1L-1D), 2(2L-2D), AND 3(3L-3D)

	Light	Dark
Exp. 1		
Ruminating time	196	192
Masticating time	40	37
Exp. 2		
Ruminating time	241	140
Masticating time	41	29
Exp. 3		
Ruminating time	224	149
Masticating time	40	28

Means (Min./12 hours).

Ruminating and masticating behaviors are presented in table 1. In the 1L-1D cycle, no differences were observed in the lengths of rumination and mastication between light and dark periods. In 2L-2D and 3L-3D cycles, ruminating and masticating times in the light periods were longer by 72, 41 and 50, 43% than those in the dark

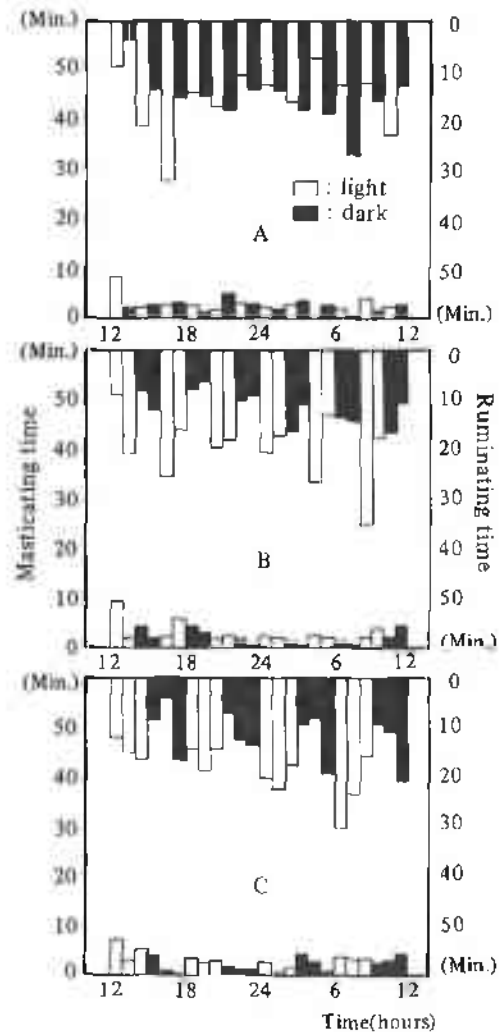


Figure 1. Effects of light and dark cycle (1L-1D: A, 2L-2D: B, 3L-3D: C) on ruminating, resting and masticating time.

periods, respectively ($P < .01$).

The histograms for the light and dark period, shown in figure 1(A), have the highest incidences of rumination in the hours between 16:00-17:00 and 07:00-08:00 h, respectively. The most active mastication was observed at 12 hours after feeding.

The cumulative histograms for the lighting system, shown in figure 1(B), were not consistent and fluctuated under the condition of the 2L-2D cycle. Goats ruminated and masticated more frequently in light than in dark periods.

The result in figure 1(C) shows lower ruminating fluctuation in 3L-3D compared to the 2L-2D cycle. Change in the lighting system from the 2L-2D to 3L-3D cycle increased the lengths of time spent for rumination in dark periods with decrease in the light periods. But mastication was not affected.

When goats were exposed to 2L-2D and 3L-3D alternating cycles, mastication was promoted by

light but influenced by darkness. The feeding pattern in the present experiment was similar to those in other workers who observed that diurnally controlled photoperiod affects on size and frequency of meals. Rumination was also stimulated by light but checked by darkness. Gordon and McAllister (1970) reported that ruminating behavior increased during the night period from 24:00 to 08:00 h independent of the 8L-8D cycle. Ruminating behaviors of goats described here were not agreeable with the results of above authors.

(Key Words: Light-dark, Rumination, Mastication)

Literature Cited

- Gordon, J.G. and I.K. McAllister. 1970. The circadian rhythm of rumination. *J. Agric. Sci. Camb.* 74:291-293.