

Effect of daylength on voluntary intake, extent of digestion and chewing behaviour in housed sheep

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Most feed evaluation studies of conserved forages are performed indoors with "standard" sheep and cattle. Ingestibility, digestibility and chewing behaviour patterns associated with a forage are measured at a given time of the year giving one observed value. However, influence of photoperiod on voluntary intake was clearly shown in ewes (Bocquier, 1985, Thèse, INA Paris, 105 p) and adult wethers (Michalet-Doreau and Gatel, 1988, Ann Zootech, 37, 151-158).

Objective of present study is to evaluate evolution of voluntary intake, extent of digestion and chewing behaviour in sheep housed from october through march under continuous artificial lighting additional to natural daylength.

Three wethers and six ewes, 1/2 Ile de France x 1/2 Texel, 6 to 9 months old at beginning of experiment were fed during 6 sequential periods (october through march) chopped hay (94.7 ± 0.2 % OM, 69.1 ± 1.0 % NDF, 6.7 ± 0.5 % CP) *ad libitum* and 250 g/d concentrate (92.3 ± 0.3 % OM, 36.5 ± 1.6 % NDF, 15.5 ± 1.0 % CP). Each experimental period lasted at least 28 d : minimum 11 d of "rest" in individual straw bedded floor pens, followed by 7 d adaptation to digestion crates and wearing of a harness

with sponge-filled rubber balloon to record jaw movements (3 or 4 last d), and 10 last d of measurements of daily voluntary intake, extent of digestion and concurrently 5 d of continuous recording of jaw movements. Data were subjected to variance analysis for repeated measurements using a F-test adjusted according the epsilon coefficient of Huynh-Feldt (1976, cited in SAS user's guide, 1990, Vol. 2, GLM VARCOMP, Version 6, SAS Institute Inc). Pairwise differences between periods were tested using contrasts.

Voluntary intake decreased from october to January, and increased significantly in February and march. Digestibility of OM and NDF, daily eating and ruminating time were unchanged throughout the 6 months. However, digestibility of CP, unitary eating and ruminating time were largest in January. Lowest intake level in January was associated with largest number of daily meals which were of shortest mean duration.

Results are interpreted to suggest that ingestibility (fill units) and associated mastication index for a given forage or diet is significantly dependent on daylength. This daylength effect should be incorporated in a feed evaluation system.

	Oct	Nov	Dec	Jan	Feb	March	P-Value
Voluntary intake (g DM/kg BW ^{0.75} /d)	51.10 ^{ab}	49.38 ^{ab}	47.84 ^a	46.29 ^a	55.35 ^b	57.36 ^b	0.015
Digestibility (%) :							
OM	59.38	58.28	59.16	58.45	58.70	57.44	0.48
NDF	55.78	54.77	56.13	55.91	56.89	55.99	0.28
CP	46.51 ^{bcd}	44.61 ^{bc}	49.33 ^d	44.91 ^{cd}	41.22 ^b	38.91 ^a	0.0001
Eating time :							
min/d	301.40	260.26	263.12	275.30	292.14	266.25	0.37
min/g DM/kg BW ^{0.75}	6.25 ^b	5.39 ^{ab}	5.63 ^b	6.08 ^b	5.76 ^b	4.49 ^a	0.04
Meals (number/d)	6.84 ^{bc}	6.53 ^b	5.44 ^a	7.96 ^c	5.93 ^{ab}	5.64 ^a	0.0001
Rumination time :							
min/d	572.06	569.32	539.29	563.86	572.45	553.97	0.58
min/g DM/kg BW ^{0.75}	11.70 ^b	11.75 ^b	11.59 ^b	12.44 ^b	11.58 ^b	9.53 ^a	0.02