

VOLUNTARY INTAKE OF GRASS SILAGE IN RELATION TO CHEWING ACTIVITY AND RATE OF DISAPPEARANCE FROM RUMEN IN DAIRY HEIFERS

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Introduction

Forage intake in ruminants is mainly controlled by rumen fill and is affected more by the proportion of fiber digestion and rate of passage than by rate of fiber digestion (Mertens and Ely, 1982). Feed particles have to be reduced to a size which enables their passage through the reticulorumen orifice. This is obtained through the combined action of microbial fermentation in the rumen and mastication of the animal. The purpose of the present study was to examine intake of wilted grass silage harvested at two stages of maturity and of direct cut grass silage, in relation to chewing activity, turnover rate in the rumen, and "in sacco" disappearance.

Materials and Methods

Six Friesian nonpregnant dairy heifers, about 3 years of age, weighing an average of 479 kg at beginning of the experiment, were fitted with a ruminal cannula of 12.3 cm of diameter. They were fed ad libitum with wilted grass silages of either early (W_{ec}) or late (W_{lc}) spring cutting or with direct cut grass silage of early spring cutting (Dec). The silage of late cutting was supplemented with 1 kg soybean meal. All silages came from the same meadow and were composed of *Lolium perenne* (81%), *Poa pratensis* L. (9%) and *Phleum pratense* (5%). They were harvested under excellent weather conditions. Chemical composition

TABLE 1. CHEMICAL COMPOSITION OF GRASS SILAGES

	W _{ec}	W _{lc}	Dec
DM (%)	40.3	48.1	20.3
CP (% of DM)	16.0	9.9	16.0
NDF (% of DM)	42.4	58.5	41.6

of silages is given in table 1. The amounts offered to the animals were calculated to exceed intake on the previous day by at least 10%; refusals were removed and weighed in the morning.

Chewing activity was recorded according to Ruckebusch (1963). In sacco disappearance was established according to Ørskov and McDonald (1979); the pore size of the bags was 50 µm. Cr-mordanted silages were given in a pulse-dose through rumen cannulae; turnover rate was established by calculating slope of the line obtained by regressing natural logarithm of Cr concentration in fecal DM against time. Cr was analysed according to Petry and Rapp (1971). Results were compared by a t-test (Snedecor, 1965).

Results and Discussion

Daily dry matter intake and chewing activity are presented in table 2. Highest intake was recorded with wilted grass silage of early cutting while direct cut silage was poorly ingested, although both forages had the same NDF content (table 1). Total chewing time per day was about identical for all treatments, but there was a shift from eating time to ruminating activity when grass was wilted prior to ensiling; no difference appeared between wilted silages with regard to cutting date. Related to dry matter intake, eating time and total chewing activity were negatively related to intake, while ruminating time showed variable results.

Though no notable difference was recorded for rate of disappearance and potentially degradable NDF fraction between W_{ec} and Dec, mean retention time was clearly higher for the latter silage (figure 1). With W_{lc}, degradation was diminished and retention time augmented. Neither rate and extent of NDF disappearance nor rumen turnover rate varied in the same way as voluntary intake of the different silages.

TABLE 2. INTAKE AND CHEWING ACTIVITY

	W _{ec}	W _{lc}	D _{ec}
Intake (kg·d ⁻¹)	11.3± 0.8 ^a	10.4± 0.8 ^b	9.6± 0.7 ^b
Eating time (min·d ⁻¹)	452±57.3 ^a	448±55.1 ^a	537±53.7 ^b
(min·kg DM ⁻¹)	40.0± 5.3 ^a	43.1± 7.5 ^a	55.9± 6.6 ^b
Ruminating time (min·d ⁻¹)	570±52.0 ^a	584±39.4 ^a	457±26.1 ^b
(min·kg DM ⁻¹)	50.4± 7.1	56.2± 4.5	47.6± 5.4
Chewing time (min·d ⁻¹)	1022±49.4	1032±67.7	994±35.7
(min·kg DM ⁻¹)	90.4± 9.1 ^a	99.3±10.8 ^b	103.5± 8.8 ^b

a,b Means with different superscripts differ (P < 0.05).

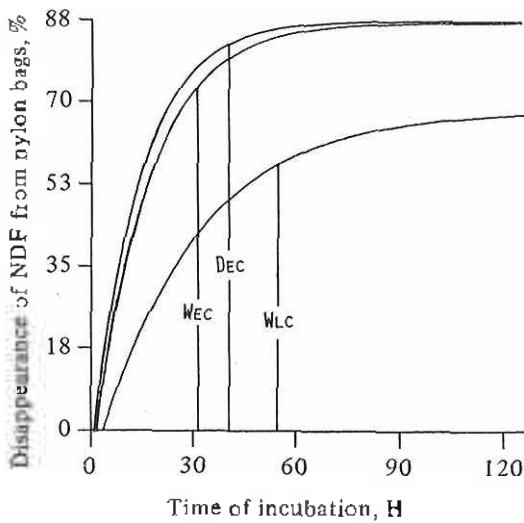


Figure 1. Mean ruminal retention time (vertical lines) and disappearance of NDF from nylon bags versus time of incubation, W_{ec}, wilted early cut grass silage; W_{lc}, wilted late cut; D_{ec}, direct early cut.

It was concluded that the chewing index was the most reliable criteria for prediction of voluntary intake with grass silage diets.

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(Key Words: Intake, Chewing Activity, Rumen Turnover)

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