Measurement of short term intake rate (STIR) to predict *in vivo* parameters in sheep

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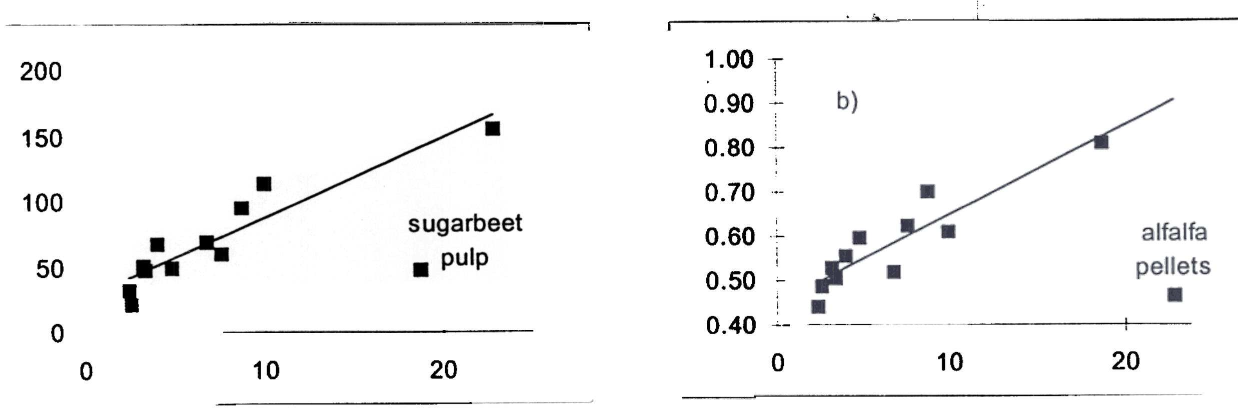
Introduction: It might be expected that the same physical characteristics of a feed, determining the rate of breakdown in the rumen and physical fill, might also influence the rate at which an animal is able to eat a feed. Moseley and Manendez (1989) observed a positive relationship between intake rate measured over 1 minute periods and voluntary intake *ad libitum*. These authors also suggested that determination of eating rate could be used as a rapid method to evaluate intake characteristics of forages. The present work examines further the potential of what will now be referred to as short term intake rate (STIR value), as a method to rank forages in terms of their potential intake, digestibility and rate of passage.

Materials and Methods: Twenty four, individually fed wether sheep, were offered 12 single feeds *ad libitum*, over 4 periods in an incomplete latin square design. The feeds included six coarsely chopped hays and straws, soaked sugarbeet pulp, alfalfa pellets, maize gluten feed, wheat feed and commercial mixtures of chopped alfalfa and alfalfa with oat straw. CP and ADF contents ranged from 37-213 and 170-598 g/kg DM respectively. Intake and digestibility were determined over a 7 day period and rate of passage estimated using chromium mordanted feed. STIR values were determined at the end of the feeding trial, by accurate recording of time spent actively eating and DM consumed, when sheep were offered feeds for periods of approximately 4 minutes. Over a period of 3 days, STIR values for every feed were determined with each sheep once, measurements being made after a 4 hour period of starvation and with 30 minutes between each measurement. The feeds were offered in a sequence designed to account for carry-over effects.

Results: Mean STIR values, estimated using analysis of variance to adjust for missing values, were plotted against *in vivo* parameters estimated in the same way. R^2 values were poor for intake and digestibility when all feeds were included in the regression (0.48 and 0.14 respectively), but improved when values for sugarbeet pulp or alfalfa pellets were excluded (0.86 and 0.83 respectively) (Figure 1). R^2 value for rate of passage against STIR also improved, from 0.46 to 0.76, when the data for sugarbeet pulp were excluded.

Figure 1: *a) Intake (g DM/kg $M^{0.75}$) and b) apparent DM digestibility coefficients plotted against STIR (g/min). Regression lines are for all data except a) sugarbeet pulp and b) alfalfa pellets.*



Conclusions: It might be expected that for sugarbeet pulp, with a high content of water soluble carbohydrate (251g/kg DM) metabolic feed-back factors may inhibit eating before physical fill. If this is the case, it is not surprising that STIR, reflecting the physical characteristics of the feed is not a good predictor of intake or rate of passage for this feed. For the alfalfa pellets, it is likely that the high rate of passage observed (0.035/h) resulted in the high intake recorded (155 g/kg $M^{0.75}$), but reduced digestibility. The results indicate that STIR values show potential to predict some *in vivo* parameters and rank a variety of feeds. The method requires only small amounts of material and very little equipment, making it an ideal technique for use in less developed countries. In agronomic trials, where amounts of material are small, the technique offers an opportunity to take account of animal factors in preliminary evaluations. Further work is required to identify where these relationships break down and when additional parameters, such as particle size and concentration of rapidly fermentable material, are required to adequately describe the feed.

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References: Moseley G and Manendez A A (1989). Factors affecting the eating rate of forage feeds. *Proceedings of the XVI International Grassland Congress, Nice, France*, pp. 789-790.