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Measurement at pasture of intake , digestibility and chemical composition of the diet of nursing ewes , using Faecal NIRS

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Key words : pasture , diet quality , intake , digestibility , faecal NIRS , suckling ewes , Tropics

Introduction To improve efficiency of animal production at pasture , the evaluation of the diet *in situ* , is a prerequisite . Faecal NIRS can be a good alternative to estimate the diet quality of grazing animals , by providing a rapid , low cost and highly reproducible diagnostic (Review of Shepherd and Walsh , 2007) . The objective of this study was to use the faecal NIRS method calibration previously realised for rams in stalls , to evaluate at pasture the diet quality of suckling ewes . The consistency of the estimates using faecal NIRS was evaluated by comparing the estimated diet quality , to milk production of to pasture characteristics , since no existence of any reference method to measure the diet at pasture .

Materials and methods A trial with 12 grazing suckling ewes was carried out for 5 lambing periods (LP) , on a *Digitaria decumbens* pasture rotationally-managed for 28 days re-growth period . Faecal samples were collected per ewe three times per LP , using faecal bags and analysed using a Foss NIRSystem 6500 monochromator . From faecal spectra several parameters were determined using previously published faecal NIRS calibrations : organic matter digestibility (OMD) , organic matter intake (OMI) , digestible OMI (DOMI) , the crude protein content of the herbage ingested (CPi) . Simultaneously , the individual milk production (MP) of the ewes , and the pasture characteristics were measured : the biomass , the CP content of the herbage (CPh) and the leaf mass . The relationships between the diet quality , the milk production and the characteristics of the pasture were analyzed .

Results OMI and DOMI (g/kg LW^{0.75}) were higher at the 1st and the 4th LP (P<0.01 , Table 1) . OMD and CPi varied in an opposite way , being higher at the 2nd and the 5th LP (P<0.01) , as the CPh and the leaf mass . Compared to the milk production , the estimates of OMI and DOMI varied in the same way (Figure 1) , whereas OMD was negatively correlated to MP (r=-0.56 , P<0.001) . Compared to characteristics of the pasture , OMD and CPi were positively correlated with CPh (r=0.28 , P<0.03 ; r=0.50 P<0.001) , whereas the ADFi decreased with the CP content of the herbage offered (r=-0.54 , P<0.01) .

Table 1 Characteristics of the diet of grazing nursing ewes estimated using faecal NIRS : organic matter (OM) intake , OM digestibility , digestible OM intake (DOMI) , and chemical composition of the herbage ingested , the crude protein (CPi) . In a row , means with a common superscript letter are not different , P < 0.05 . R . S . D : residual standard deviation of the model .

	LP1	LP2	LP3	LP4	LP5	R . S . D
Intake	83.3 ^a	68.5 ^b	63.3 ^b	85.3 ^a	47.9 ^c	0.99
OMD	64.9 ^c	67.4 ^b	66.3 ^{bc}	65.6 ^{bc}	70.5 ^a	0.94
DOMI	58.5 ^{ab}	53.3 ^b	42.7 ^c	61.9 ^a	36.8 ^d	0.98
CPi	15.9 ^c	16.8 ^b	16.5 ^{bc}	16.4 ^{bc}	18.2 ^a	0.79
ADFi	33.1 ^b	34.2 ^a	32.7 ^b	32.9 ^b	32.7 ^b	0.43
ADLi	3.1 ^{bc}	3.5 ^a	2.8 ^c	2.9 ^c	3.2 ^{bc}	0.32

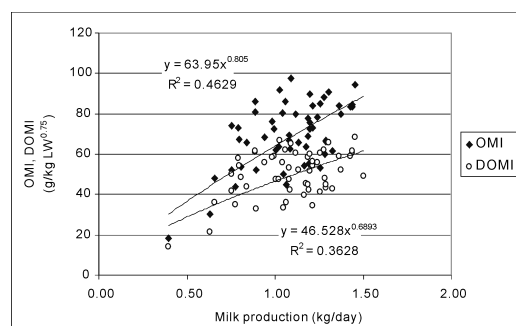


Figure 1 Daily milk production (MP, kg/day) , according to the organic matter intake (OMI, g/kg/day) , measured per grazing nursing ewes over 5 lambing periods .

Conclusions The positive relationships between OMI , DOMI and MP , suggest that the estimates using faecal NIRS calibration , provide consistent estimates of the diet at pasture . The different evolution of OMI and DOMI compared to that of OMD and CPi illustrate how it is important to measure several parameters to characterise the diet . This shows also the need of a useful tool to measure nutrition in real grazing conditions .

Reference

Shepherd , K . D . , Walsh , M . G . , (2007) . Infrared spectroscopy-enabling an evidence-based diagnostic surveillance approach to agricultural and environmental management in developing countries . *Journal of near Infrared Spectroscopy* 15 , 1-19 .