Table 1
Summary of DMI (kg/d), DIM (d), MY (kg/d), BW (kg) and parity from 136 and 275 lactations for primiparous and multiparous cows, respectively. Data recorded during the winters of 2015 to 2021.

Item	Primiparous				Multiparous				
	DMI	DIM	MY	BW	DMI	DIM	MY	BW	Parity
N	10912	10912	10912	10466	18371	18371	18371	17763	18371
Mean	18.45	87.03	28.61	611.71	22.53	110.32	33.32	700.34	3.33
SD	3.03	62.06	5.38	57.15	3.54	69.14	7.10	62.65	1.48
CV, %	16.42	71.31	18.80	9.34	15.71	62.67	21.31	8.95	44.44

Table 2
Accuracy and precision of models predicting DMI in dairy cows.

Equation	Mean DMI (kg/d)		N	RMSPE, kg/d[1]	RMSPE, %[2]	ECT, %[3]	ER, %[3]	ED, %[3]
	Obs.	Pred.						
Primiparous								
Agroscope, 1994	18.45	18.44	10912	2.50	13.52	<0.01	17.23	82.77
NRC, 2001	18.45	20.61	10466	3.78	20.49	32.57	1.95	65.48
Gruber et al., 2004	18.65	20.20	7514	3.09	16.58	25.21	6.30	68.48
CSIRO, 2007	18.45	20.46	10466	3.41	18.47	34.97	12.77	52.26
FEDNA, 2009	18.45	20.61	10466	3.78	20.49	32.57	1.95	65.48
Multiparous								
Agroscope, 1994	22.53	22.56	18371	3.02	13.42	0.01	19.95	80.05
NRC, 2001	22.54	24.56	17763	4.23	18.79	22.77	0.01	77.23
Gruber et al., 2004	22.70	25.43	13290	4.62	20.34	35.10	1.86	63.04
CSIRO, 2007	22.54	21.04	17763	3.91	17.33	14.69	12.92	72.40
FEDNA, 2009	22.54	24.56	17763	4.23	18.79	22.77	0.01	77.23

[1] RMSPE: Root mean square prediction error.
[2] RMSPE, %: RMSE expressed as a percentage of the observed mean value.
[3] Error decompositions are expressed as a percentage of mean square prediction error.

RMSPE of 8.9 and 5.8 % for the NRC and Gruber model, respectively. Among others, the lower proportion of forage (58%) in the diet may explain the observed discrepancy (see Table 2).

Conclusion and implications

The relative elderly model of Agroscope solely including parity, energy corrected milk yield and DIM was most suitable with the recent Agroscope indoor DMI database. The relative high ER is indicative that an update of the coefficients in that model is required.

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58. Diurnal variation in water-soluble carbohydrate contents of pasture affects milk production of dairy cattle: a simulation approach

G. Menegazzi [a,b,*], P.Y. Giles [b], D.A. Mattiauda [b], F. Elizondo [b], T.C.M. Genro [c], W.J.J. Gerrits [a], J. Dijkstra [a], P. Chilibroste [b]

[a] Animal Nutrition Group, Wageningen University and Research, 6700AH Wageningen, the Netherlands
[b] Facultad de Agronomía, Universidad de la República, 60000 Paysandú, Uruguay
[c] Empresa Brasileira de Pesquisa Agropecuária, 96401-970 Bagé, Brazil

[*] Corresponding author: Gabriel Menegazzi
E-mail: gmenegazzi@fagro.edu.uy

Introduction

Sward height is strongly related to the daily DM intake (DMI) of grazing dairy cows, consequently determining animal performance. Menegazzi et al. (2021) evaluated post-grazing sward heights of *Lolium arundinaceum* pasture, viz. 15 (TL) and 12 (TM) cm, with unsupplemented dairy cows. Pasture DMI was equal for TM and TL, but milk production (MP) was 2.5 L/d higher on TL. Grazing time of TL cows in the first evening meal (170 min) was twice that in the morning (92 min), while TM cows had a more equal distribution of grazing time across the day (186 and 170 min for morning and evening meal, respectively), and grass digestibility was higher on TL than on TM. Sward chemical composition changes through the day with high contents of DM and water-soluble carbohydrates (WSC) in the evening. We hypothesised that a higher WSC content in the evening, associated with a higher CP level in TL selected grass, leads to greater level of rumen fermentation and digestion of TL grass, increasing MP at similar DMI. Simulations were performed using a translated version (Ahmadi et al., 2018) of CTR Dairy model (Chilibroste et al., 2008) to analyse if the observed differences in MP between the TM and TL treatment could be explained by the integration of actual cows' grazing behaviour and diurnal variation in pasture nutrient content.

Material and methods

The CTR Dairy simulates the availability of nutrients to lactating dairy cows fed discontinuously. The model structure considers the input of up to three different feeds fed independently at any time during the day and predicts release of soluble components from the feeds in the rumen, fermentation, and absorption of fermentation end products. The pasture intake pattern was constructed based on the observed grazing behaviour and daily DMI (17.8±0.64 kg DM/day) of the TM and TL cows (618 kg of BW, 224 DIM). The observed MP was 16.2±0.56 (TM) and 18.7±0.56 l/day (TL). Three different contents of WSC in the grass were assumed according to the time of the day where grazing was observed, viz. 0000 to 1059 h, 120 g/kg DM; 1100 to 1400 h, 170 g/kg DM; 1700 to 2200 h, 212 g/kg DM; based on Abrahamse et al. (2009) and Cajarville et al. (2015). The CP (120 and 127 g/kg DM for TM and TL, respectively) and NDF (558 and 581 g/kg DM for TM and TL, respectively) were according to Menegazzi et al. (2021) and assumed to be constant during the day.

Results and discussion

The predicted MP based on available glucose was 14.9 L/day for TM and 17.0 L/day for TL. The differences between the treatments agree well with the observed MP. Controversially, Menegazzi et al. (2021) reported that the NDF of the selected diet and the diet digestibility was higher on TL than on TM. The authors argued that probably a better match of nutrients along the day in the rumen of TL cows allowed a better diet digestibility despite the higher level of NDF. This corroborates the higher absorption of nutrients predicted by the model, which was 6 and 9% higher on TL than TM, for absorption of amino acids and glucose plus propionate, respectively. The higher observed CP and simulated WSC intake added to shorter grazing meals followed by a ruminating session determined a better ruminal environment and thus a higher extent of fermentation on TL than on TM cows.

Conclusion and implications

The model allowed integration of actual grazing behaviour and diurnal variation in pasture nutrient content to understand and predict differences in MP between grazing treatments. The integration between grazing behaviour and sward characteristics can generate opportunities to achieve greater efficiency in the use of nutrients throughout a grazing dairy system.

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59. Additive bayesian network for systems-oriented meta-analysis

B.R. dos Reis [*,1], S. Sujani, R.R. White

Department of Animal and Poultry Sciences, Virginia Tech, Blacksburg, VA, USA

[*] Corresponding author: Barbara Roqueto dos Reis
E-mail: barbarar@vt.edu

Introduction

Traditional meta-analysis approaches can be used to explore the associations among diet, rumen, and performance variables; however, model selection in these analyses is somewhat subjective and the data structure often presupposes collinearity among variables which presents challenges for fitting and interpretation. An alternative approach to exploring associations among diet, rumen, and performance is to leverage network analysis, specifically additive Bayesian networks allow for the inclusion of intercepts for grouping variables (i.e., study

[1] Present address: Food Science & Technology, 360 Duck Pond Dr, Blacksburg, VA 24060, USA.