Crossing grazing calendars and bulk milk analysis : is on-field validation for grass-diet in cattle possible ?

K. Dichou, C. Nickmilder, A. Tedde, G. Conter, R. Reding, A. Marvuglia, H. Soyeurt

LIÈGE université Gembloux Agro-Bio Tech
LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY LIST
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WALLeSmart
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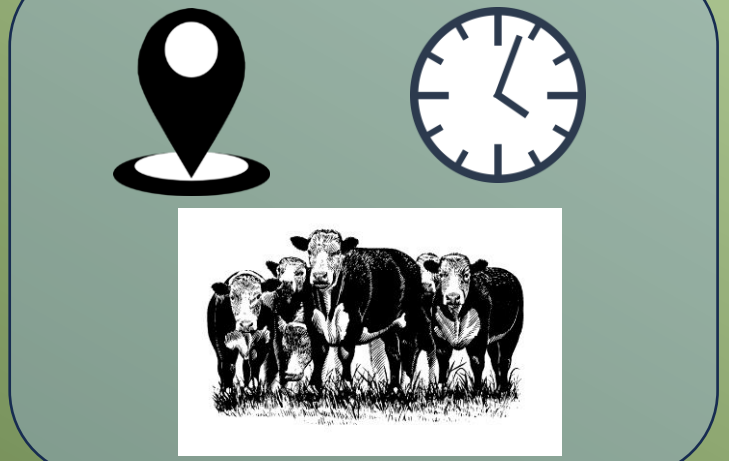
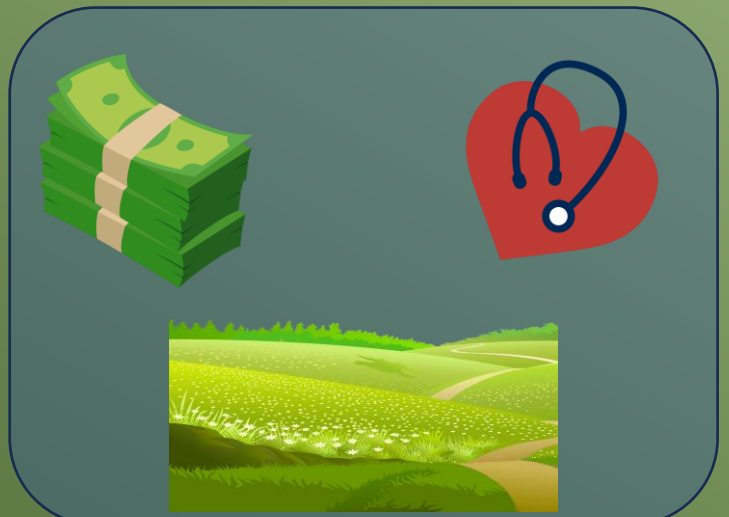
Grazing calendars

7 Farms
Over 2019-2020

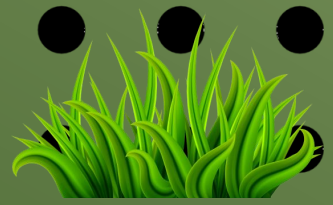




Workflow – database and hierachical clustering

DB_Pasture n=526
+- 3 days around available milk analysis

Pasture time



%GRASS

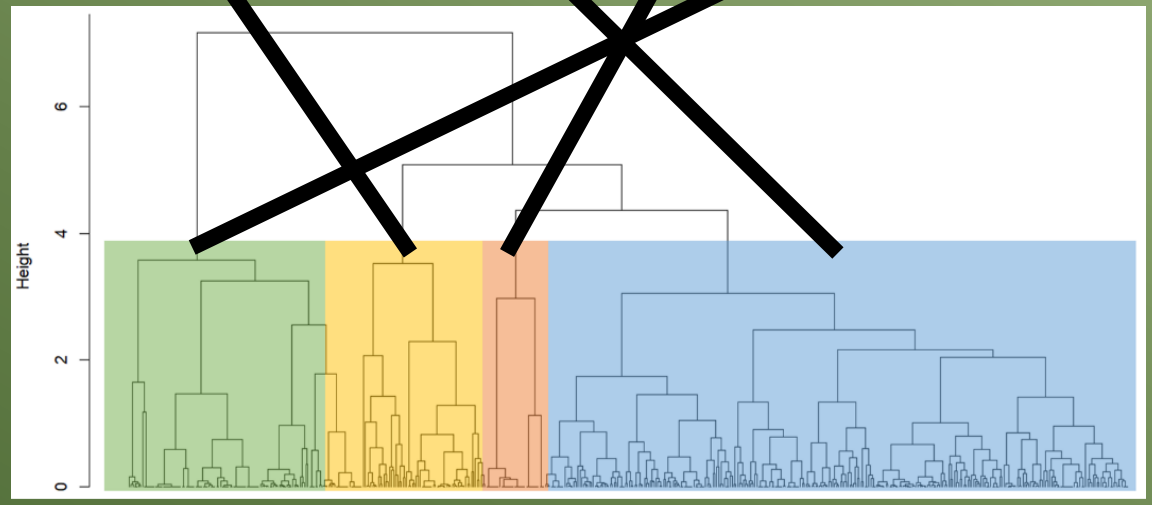
%Filling

Clustering

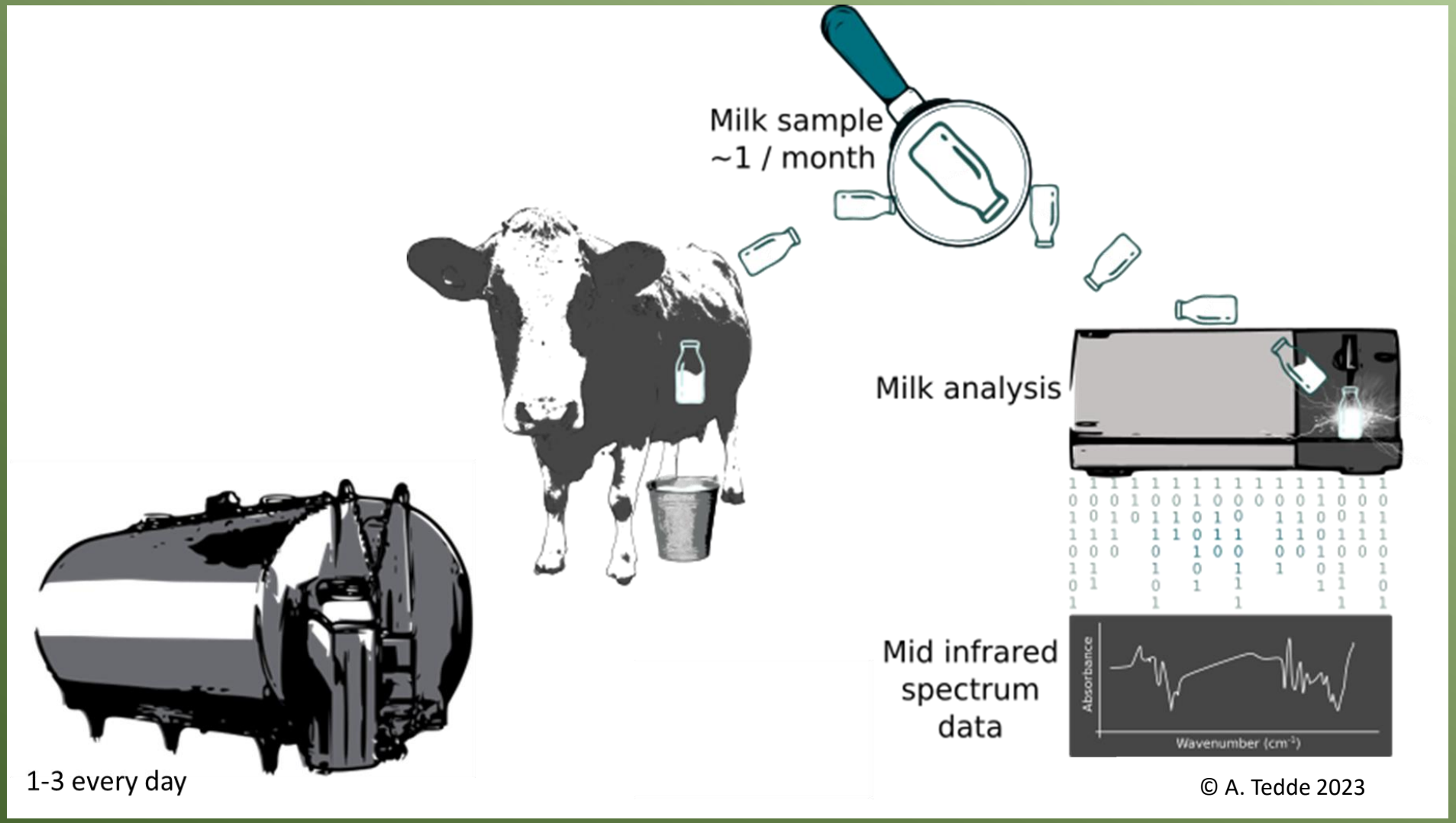
Clusters

Low — Pasture traits — High

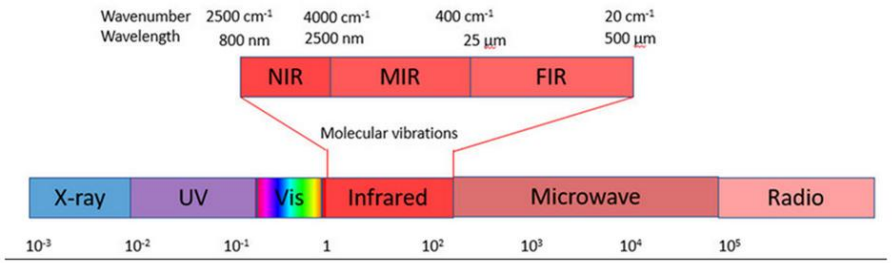
Cluster 4 | Cluster 1 | Cluster 3 | Cluster 2



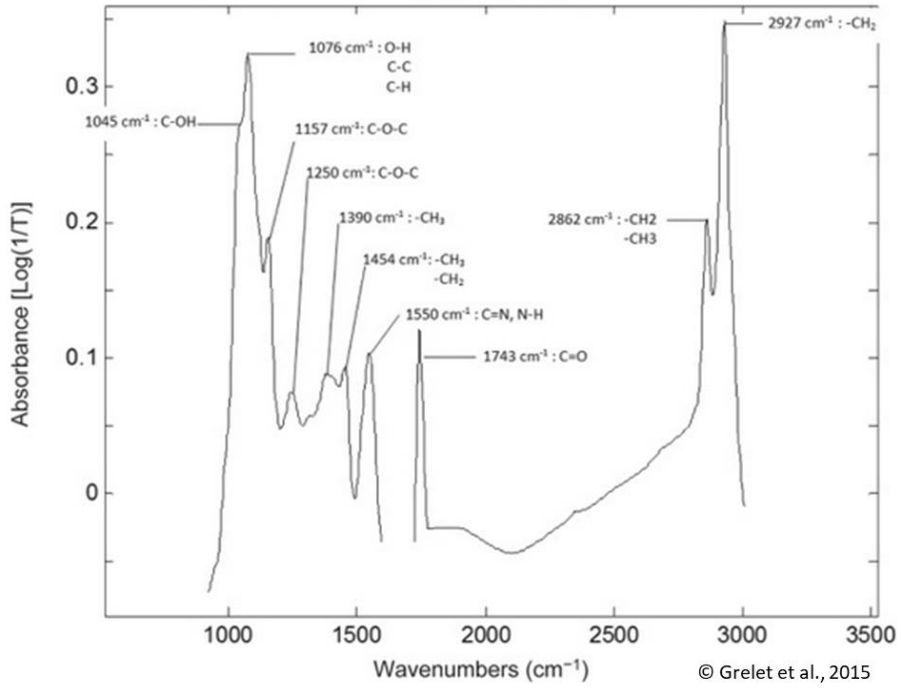
Bulk milk analysis



Bulk milk analysis

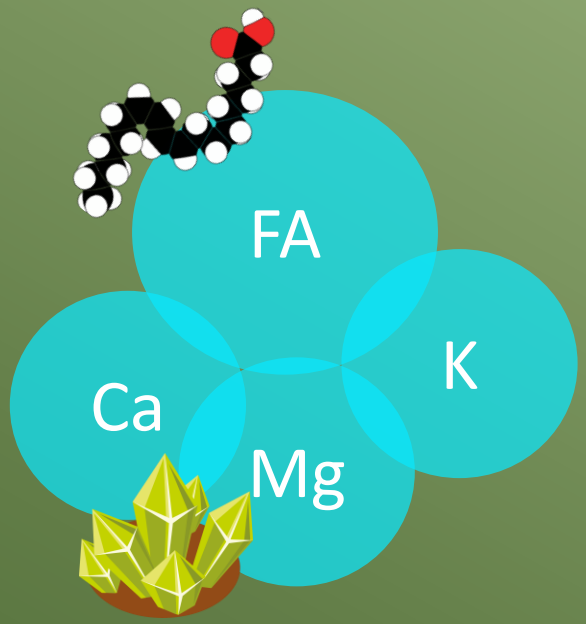


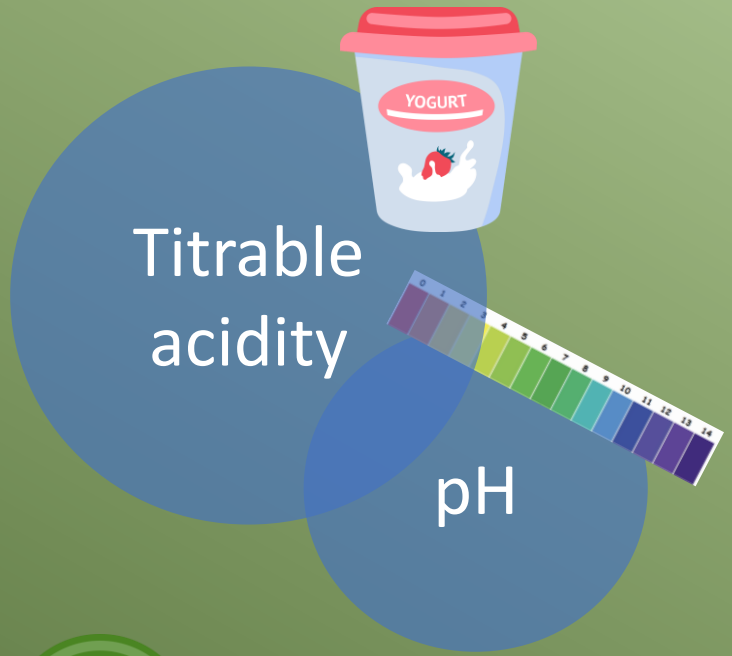
MIR spectra
=
Absorption of infrared radiation at frequencies associated with the vibrations of specific chemical bonds.

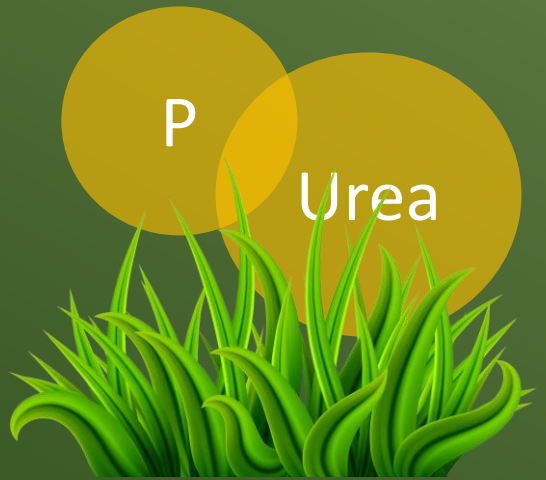


© Grelet et al., 2015

Bulk milk analysis







Workflow - ANOVA

Clusters

Low — Pasture traits — High

Cluster 4

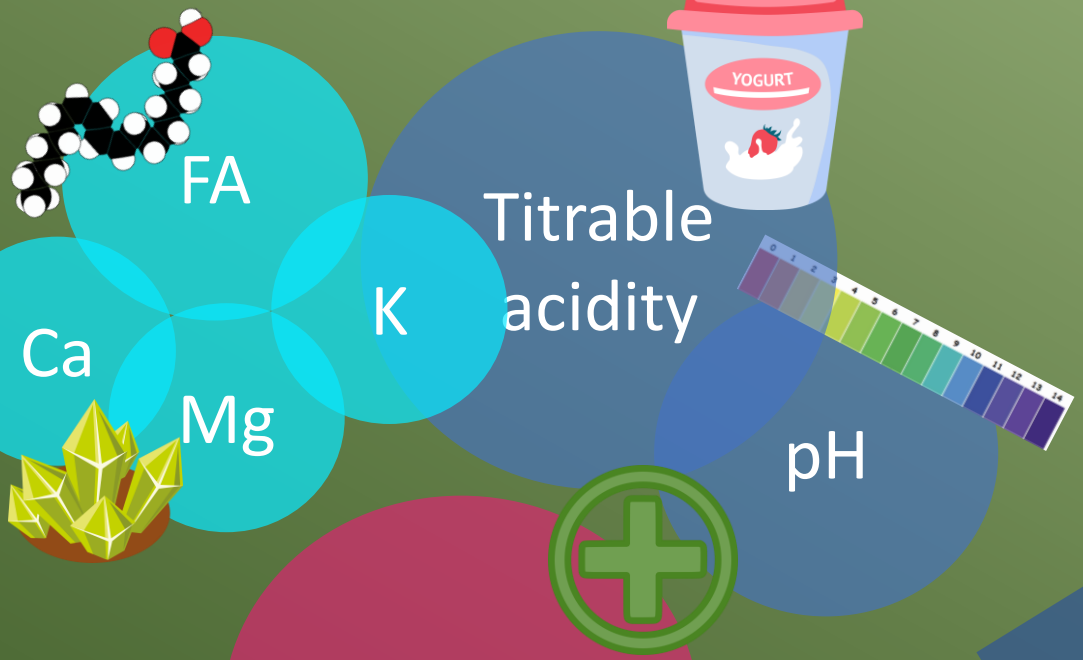
Cluster 2

DB_milk n=75

Components of interest

FT-MIR based-traits	Unit	GRASS	NoGRASS	p-value
Milk yield	kg/day	24.00	27.33	***
C14:1	g/dL	0.04	0.05	*
C16	g/dL	1.15	1.30	*
Total of C18:1 trans	g/dL	0.15	0.13	***
MCFA	g/dL	2.03	2.24	*
Total of trans FA	g/dL	0.20	0.17	***
Ca	mg/kg	1174.82	1257.21	**
P	mg/Lkg	975.67	1017.16	*
K	mg/kg	1489.80	1496.56	***
Mg	mg/kg	102.77	107.05	***
Urea in milk	mg/L	154.40	176.00	***
Protein efficiency	%	16.22	14.26	*
pH	/	6.62	6.60	**
Titrable acidity	Dornic Degree	14.78	14.35	**
Isocitrate	mmol/L	0.15	0.17	***

Workflow - PLSDA



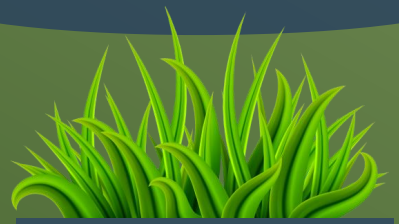
PLSDA

Grass indicator

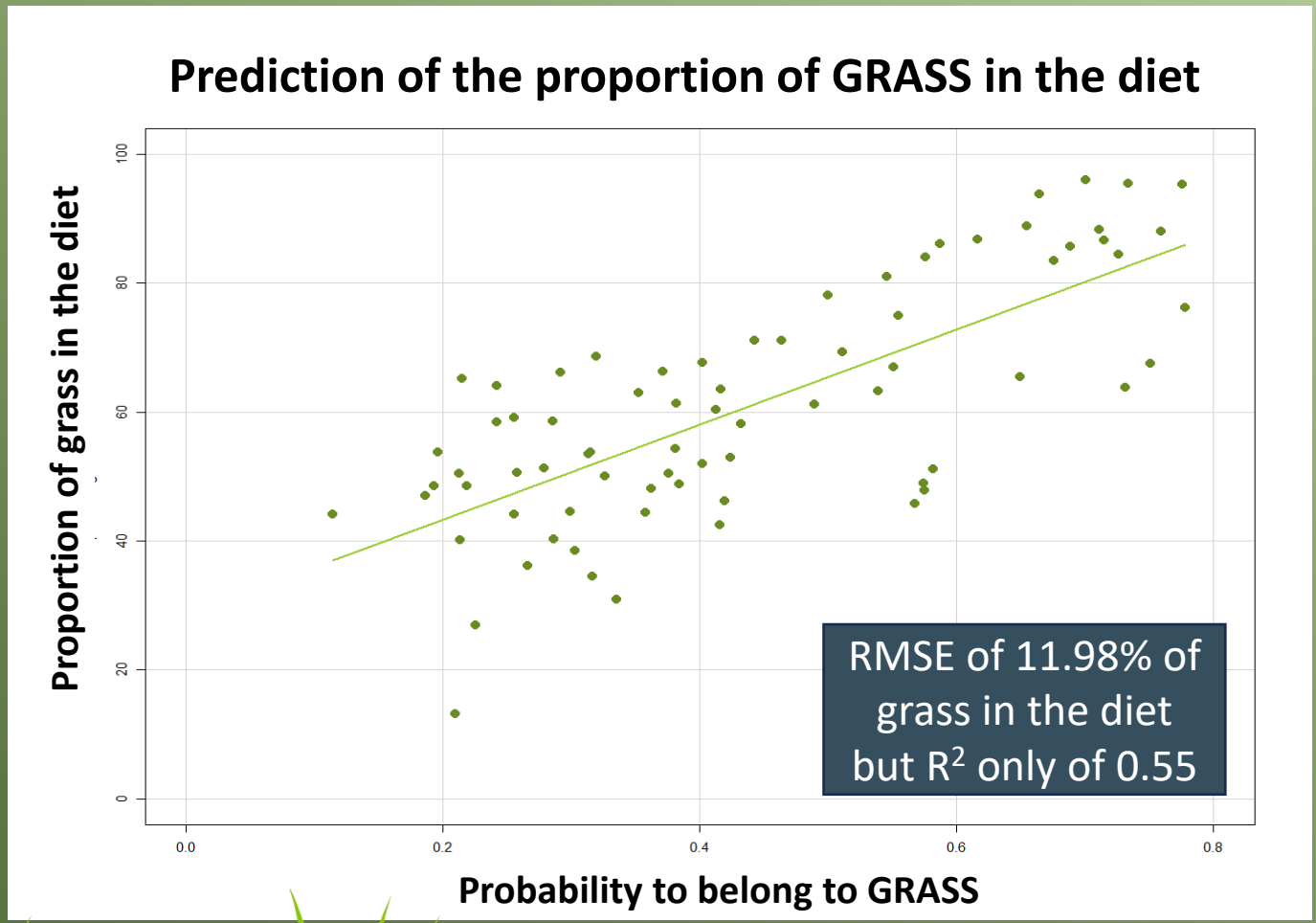
Models	Final_Model
Cluster Sampling	GRASS vs NoGRASS upsampling
Accuracy	0.92
Kappa	0.79
Sensivity	0.95
Specicity	0.89

Results

DB_Pasture n=526



%GRASS



PLSDA

OR

Probability to belong to GRASS cluster

Conclusion

- Grass based diet can be assessed through milk analysis
- Equation could be used routinely on sample


Thanks to our partners and colleagues on the projects

- WALLeSmart, SPW, [grant number D65-1435]
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Contact :
killian.dichou@uliege.be