



#42758
Session: 40



Welcome to the EAAP + WAAP + Interbull
Congress 2023
Lyon, France - August 26th / September 1st, 2023

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Near-infrared spectroscopy prediction models preliminary results in ewes' colostrum

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Introduction

- Colostrum as soon as possible after birth
- Passive transfer immunity
- Avoid negative effects on survival and performance



Photo: Interempresas Media, S.L.U

- Quality of colostrum relies on the concentration of immunoglobulins G (IgG)
- Uptake of sugar relies on insulin concentration
- Gold standard is expensive and time consuming
- Difficult to implement on a large-scale and/or in routine

**Search alternative
analytical methods**



Aim

- Evaluated the feasibility of near-infrared (NIR) spectroscopy to predict ovine colostrum quality



Colostrum differs from milk composition and specific calibration models are needed

Material & Methods

n = 45 { Lacaune, 21
Manchega, 24

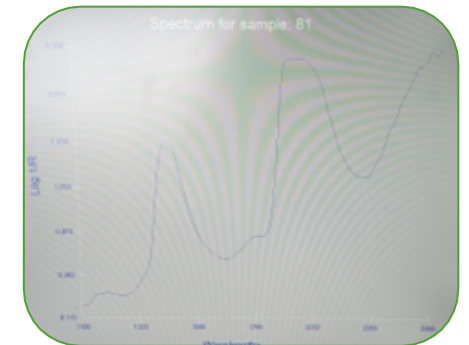
<6h post partum



40 °C /10-15 min
water bath



NIRSystems 5000 (FOSS)
1100 a 2500 nm; every 2 nm



Log(1/Transflectance)

Reference analysis

- **Fat** → Gerber method
- **Protein, True protein, Casein** → Kjeldahl method
- **Total solids** → oven at 103°C
- **IgG** → ELISA sandwich (Calokit Ovino, ZeuLAB, Zaragoza, Spain)
- **Insulin** → ELISA sandwich (Ovine insulin, Mercodia, Uppsala, Sweden)



Chemometrics

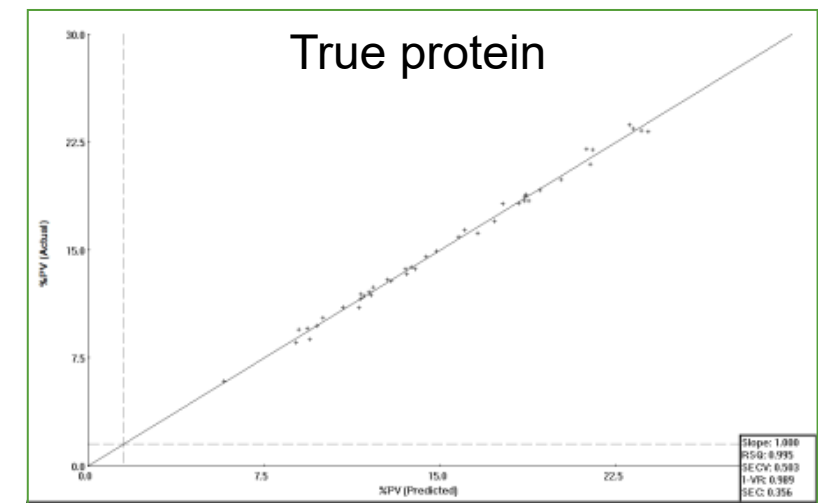
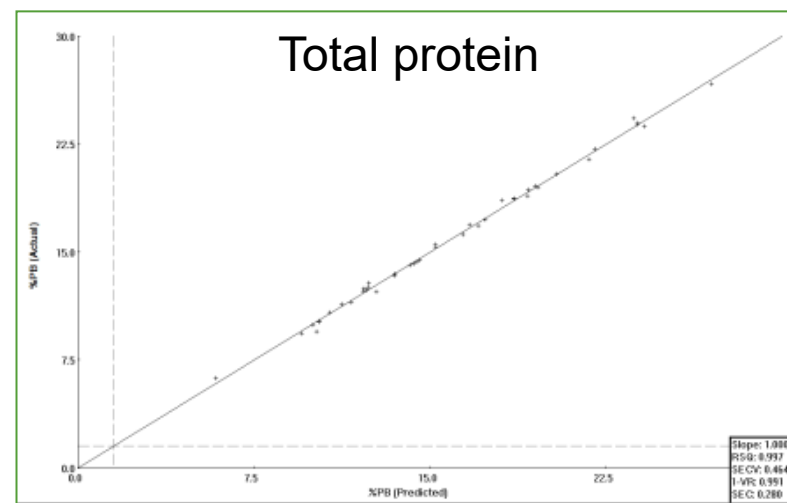
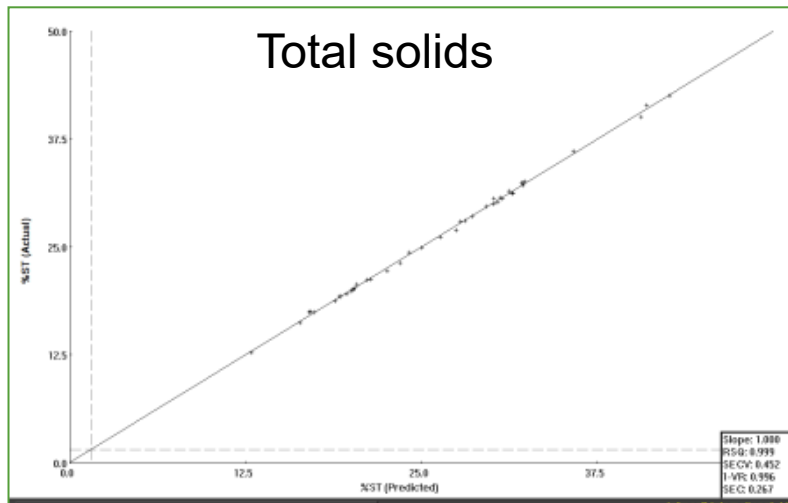
- Modified partial least squares regression
 - 5-fold cross-validation
 - T-outliers >2.5
 - 3 scatter correction (SNV+D; SNV; MSC)
 - 2 Math treatments (1,4,4,1; 2,4,4,1)



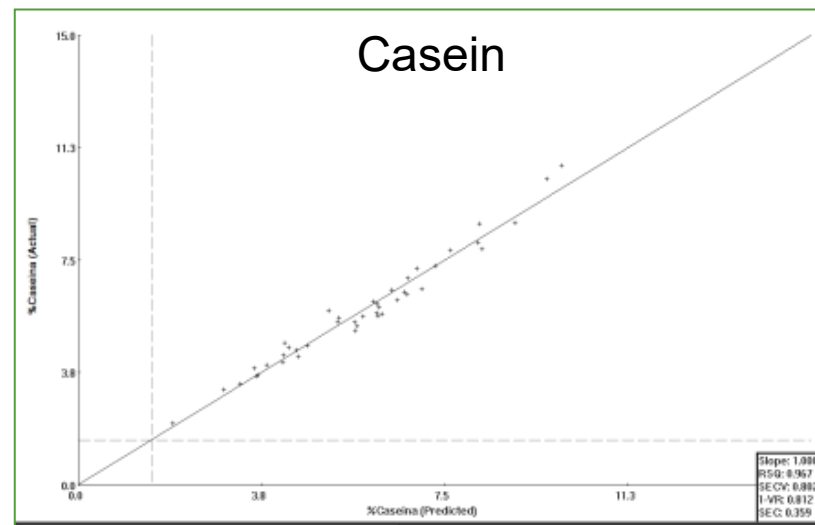
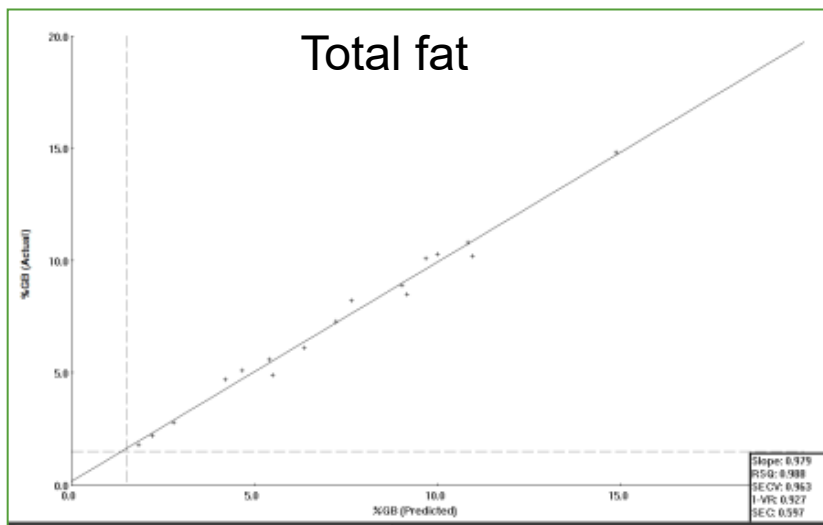
Results

Trait	n	Mean	SD	Minimum	Maximum
Total fat, %	44	7.01	3.57	0.90	16.00
Total protein, %	45	16.21	4.94	6.23	26.68
True protein, %	45	15.69	4.97	5.86	26.17
Casein, %	45	5.87	1.87	2.05	10.66
Total solids, %	45	26.79	7.39	12.77	42.49
IgG, mg/mL	44	25.10	10.96	8.51	58.20
Insulin, µg/L	45	16.01	9.97	4.20	46.19

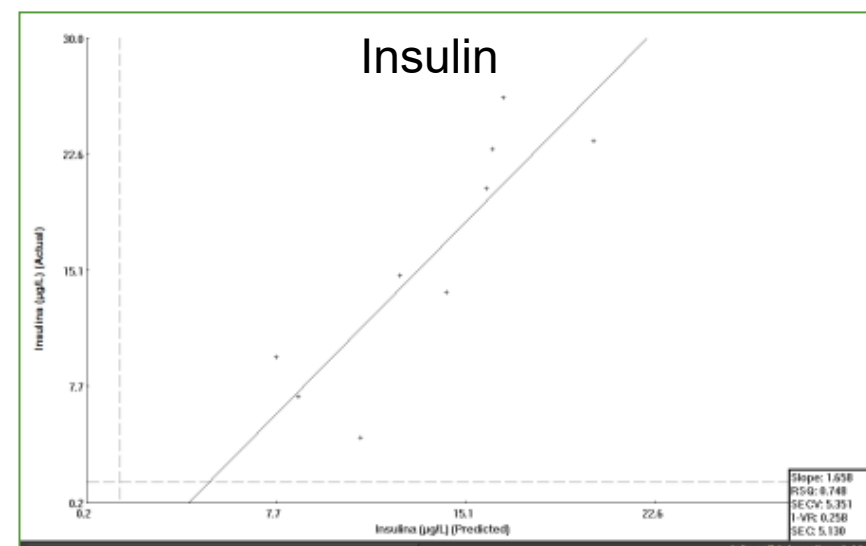
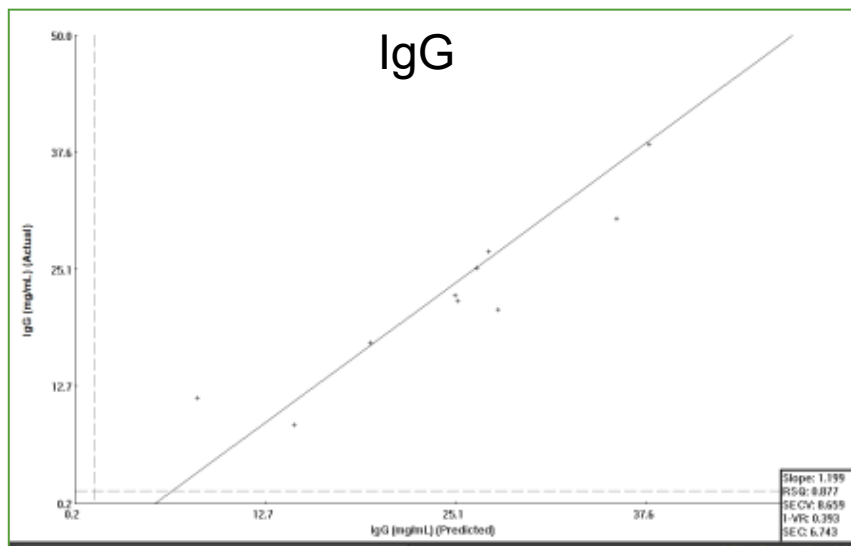
Trait	n	Equation	Term	Calibration		Cross-Validation		
				SEC	R ² cal	SECV	R ² cv	RPD
Total solids	42	SNV+DT (2.4.4.1)	5	0.267	0.999	0.452	0.996	15.84
Total protein	42	SNV+DT (2.4.4.1)	5	0.280	0.995	0.464	0.991	10.54
True protein	42	SNV+DT (2.4.4.1)	5	0.356	0.997	0.503	0.989	9.40



Trait	n	Equation	Term	Calibration		Cross-Validation		
				SEC	R ² cal	SECV	R ² cv	RPD
Total fat	41	SNV+DT (1.4.4.1)	7	0.597	0.988	0.963	0.927	3.58
Casein	42	SNV+DT (2.4.4.1)	6	0.359	0.967	0.802	0.812	2.29



Trait	n	Equation	Term	Calibration		Cross-Validation		
				SEC	R ² cal	SECV	R ² cv	RPD
IgG	44	MSC (2.4.4.1)	3	6.74	0.88	8.66	0.39	1.27
Insulin	40	SNV+DT (2.4.4.1)	1	5.13	0.675	5.35	0.26	1.14



Conclusions

- Potential of NIR spectroscopy to predict sheep colostrum gross composition
- Low accuracy of the prediction models for IgG and insulin



- Increase the number of samples



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... Thank you for your attention

Acknowledgements: CLM is a post-doctoral researcher María Zambrano from the Ministerio de Universidades of Spain and the EU-Next Generation funds