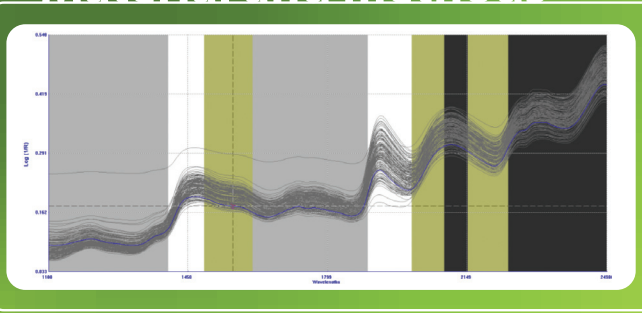
PREDICTION OF SORGHUM SILAGE NUTRITIONAL VALUES BY NIRS TECHNIQUES

Introduction and Objectives

Tests on animals made in the years 2008-2009 showed that the nutritional values assessments for sorghum through the previous works done by INRA strongly underestimated the values observed on animals (0. 70 UFL against 0.90 UFL). The genetic material used in the original study by INRA is very different from the current ones. Genetic progress including the emergence of varieties like Brown Mid Rib (BMR) has probably changed the digestibility and the energy of sorghum forages. A program called "AMS SORGHO" was initiated in 2009 to refresh the estimation model for energy values.
Program Partners: ARVALIS - Institut du végétal, CIRAD, FNPSMS/GERM-Services, French Institute of Livestock, INRA, Pro Sorgho.

Material and methods



- 200 samples selected in the registration program of French sorghum variety of 3 campaigns from 2010 to 2012
- analyzed by reference methods for Dry Matter, Protein, Ash, Starch, Fibers, Sugar and Digestibility
- 56 samples tested on animals
- collection of spectra over the entire program

Results

The tests on animals confirm :

- **the high energy values of Sorghum silage**

Tableau 2. Composition chimique et prévision de la valeur énergétique du fourrage vert des 56 lots de sorghos

		Sorgho grain (n=6)			Sorgho sucrier non BMR (n=32)			Sorgho sucrier BMR (n=18)		
		Min.	Moy.	Max.	Min.	Moy.	Max.	Min.	Moy.	Max.
Mat. minérales	(g/kgMS)	40,2	**52,8**	58,8	50,2	**80,2**	92,5	48,2	**61,4**	96,3
Amidon	(g/kgMS)	102,2	**282,5**	444,2	4,8	**153,6**	392,3	0,2	**76,1**	333,7
DCS Aufrère	(%)	52,9	**64,1**	71,8	47,8	**57,0**	67,0	55,5	**63,0**	71,0
MSndg48h	(g/kgMS)	163	**206**	249	187	**243**	317	102	**143**	182
$dMO_{prédite(vt)}$	(%)	62,7	**70,5**	74,5	59,1	**65,8**	74,6	67,5	**74,2**	80,4
$UFL_{prédite(vt)}$	(u/kgMS)	0,73	**0,87**	0,96	0,66	**0,78**	0,95	0,78	**0,93**	1,06

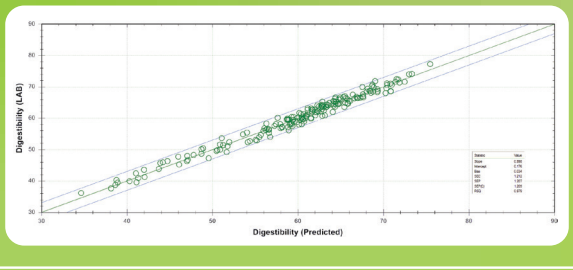
A. Férard and al., 2014

- **the fact that the previous model was underestimating the nutritional values and was not adapted to the new genetics.**

	Sorgho grain (n=6)	Sorgho sucrier non BMR (n=32)	Sorgho sucrier BMR (n=18)
UFL INRA 2007 (u/kg MS)	0.75	0.73	0.74
UFL AMS Arvalis 2013 (u/kg MS)	0.87	0.78	0.93

Emergence of a new model of prediction from the chemical constituents (Digestibility - Starch - Ash)
UFL = -0.1877738 – 0.0149035 * Ash – 0.0046667 * Starch + 0.0198301 * Digestibility

An alternative method by Infrared is developed in order to predict sorghum energy values



Discussions

- A model applicable on current genetic
- Relevant on forages newly silage
- Another model proposed by INRA would be better fitted for fermented forage (Aufrere 2012)
- NIRS: a fast alternative method, robust and inexpensive for ranchers, food manufacturers and seeds companies
- NIRS analysis : a tool in order to optimize rations

REFERENCE:
Férard, A., Meslier, E., Cabon, G., Brunschwig, P., and Aizac, B. (2014b). Mise au point d'une équation de prédiction de la valeur énergétique du sorgho fourrager monocoupe à partir d'échantillons « en vert ». Actes AFPF, Concilier Productivité et Autonomie En Valorisant La Prairie.

Aufrère, J., Emile, J.-C., Dozias, D., Delaby, L., Le Morvan, A., Barré, P., and Baumont, R. (2013). Variation et prévision de la valeur énergétique de l'ensilage de sorgho plante entière. Renc. Rech. Ruminants 20, 105.

FNPSMS/ GERM-SERVICES

1000 SORGHUM SAMPLES ANALYZED BY NIRS METHOD EACH YEAR

BOTH ESTIMATION MODELS FOR ENERGY VALUES ARE USED BY THE LAB DEPENDING ON THE NATURE OF THE SORGHUM SILAGE RECEIVED.

GERM-SERVICES IS INVOLVED IN THE EVALUATION OF SORGHUM VARIETIES FOR REGISTRATION IN THE FRENCH CATALOGUE AS REFERENT LABORATORY FOR ASSESSMENT OF NUTRITIONAL VALUES.

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