ICAR 2015
TECHNICAL WORKSHOP

Bretagne Conseil Elevage Ouest
Créateur de valeur, naturellement®

Clasel
conseils et services en élevage

Estimation of the prevalence of Subacute ruminal acidosis in dairy herds

I. CONTEXT

Evolution of dairy farms :

Number of dairy farms↘ ↘… And size of dairy farms ↗↗

	BCEL Ouest (2003-2013)
Number of dairy farms	- 33 %
Number of cows/farm	+ 40 %
Milk produced/farm	+ 48 %

Evolution of dairy farming systems :

Cows produce more milk↗↗

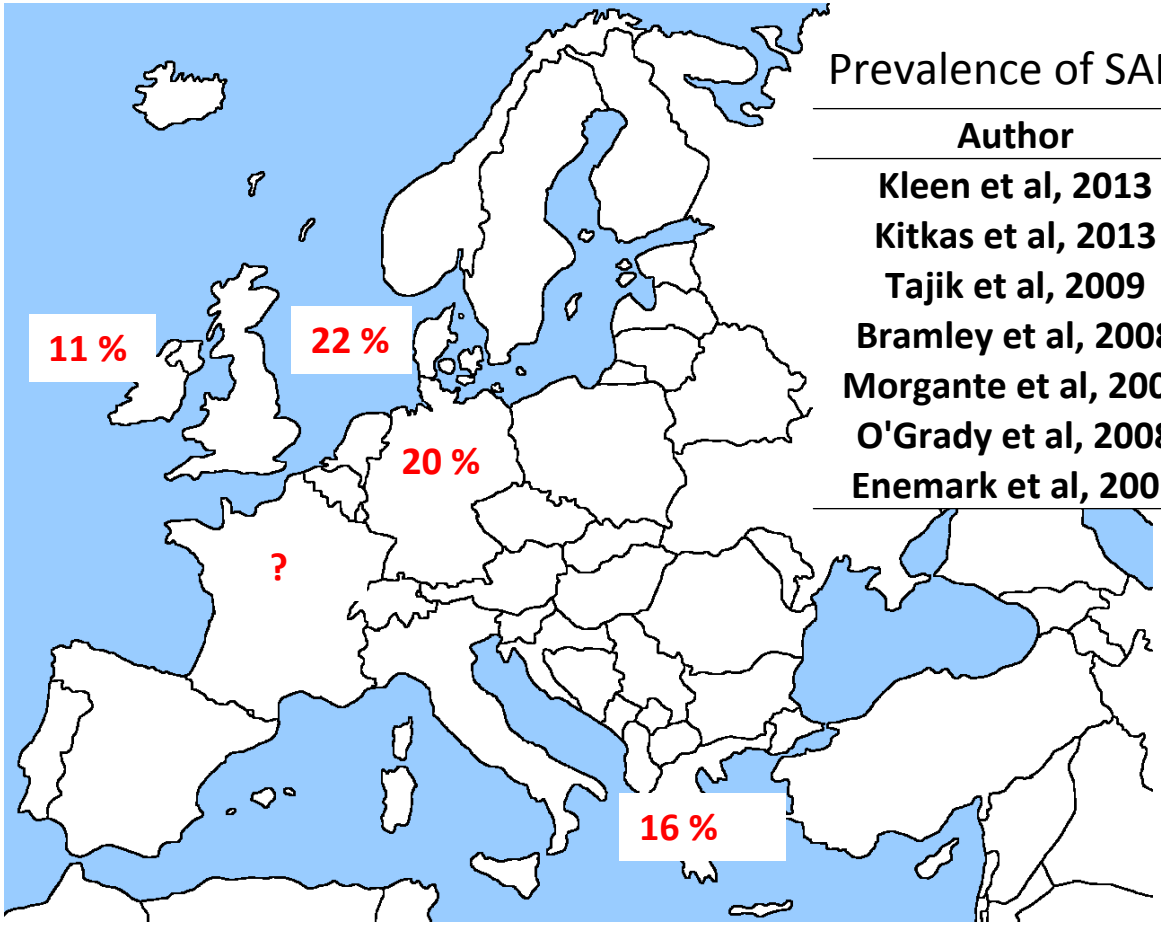
7387 kg in 2003 ➔ 8415 kg in 2013

Feed management evolution

↘ Grazing ↗ Silage stocks

Intensification of dairy farming system induces new problems, specific to high-producing dairy cows ➔ SARA : Sub-acute ruminal acidosis

I. CONTEXT



Prevalence of SARA in the world

Author	Country	Prevalence
Kleen et al, 2013	Germany	***20%***
Kitkas et al, 2013	Greece	***16%***
Tajik et al, 2009	Iran	***28%***
Bramley et al, 2008	Australia	***8%***
Morgante et al, 2007	Italy	-
O'Grady et al, 2008	Ireland	***11%***
Enemark et al, 2001	Denmark	**22%**

Between 8 and 28 % of cows are impacted by SARA

SARA is currently considered as one of the most important nutritional diseases which impact high-producing dairy cows *(Plaizier et al, 2009).*

II. PROBLEMATIC

SARA = Major nutritional disease of the dairy cows

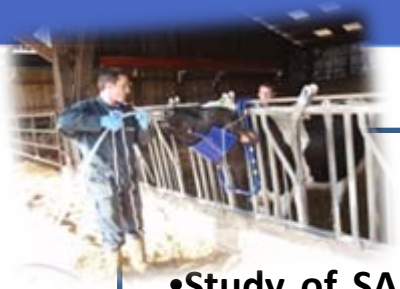
But …

No methods for routine detection
Ruminal pH ? Milk fat and protein ?

Lack of knowledge of SARA :
Prevalence & incidence ?

Objective of the study:
- **To get new knowledge of SARA in commercial dairy farms**
- **To confirm risk factors existing in bibliography**
- **To assess the reliability of milk fat and protein contents as predictor of SARA**

III. MATERIAL & METHODS



PART 1

•Study of SARA in dairy cows using pH measurements obtained on ruminal fluid samples collected by a stomach tube. Prevalence, incidence and risk factors of the disease in commercial farms.

PART 2

•Study of SARA in dairy cows using milk fat and protein contents obtained by individual milk recording. Prevalence, incidence, and risk factors of the disease in commercial farms.

III. MATERIAL & METHODS – Part 1

1

Selection of herds according to:

- Presumption of acidosis
- Presence of cow head-locks
- Breeder's agreement

Signs of acidosis:
Yellow, liquid faeces and presence of air bubbles ; Decrease of milk fat content ; Low rumen filling despite a diet that matches animal requirements ; High concentrate level

2

Selection of 12 cows per herd according to diet:

- TMR: cows between 100-150 DIM
- Individual distribution of concentrates: cows between 5-50 DIM

Cows with biggest capacity of ingestion or cows with biggest quantities of concentrates

3

Measurements and observations on the farm:

- Collection of rumen juice sample by oro-ruminal probe
- pH measurement
- Redox potential determination
- Rumen fill
- Body condition score
- Faeces evaluation
- Diet evaluation
- Breeder questionnaire

+ milk recording

III. MATERIAL & METHODS – PART 2

Bretagne Conseil Elevage Ouest
Créateur de valeur, naturellement®

Objective of the part 2:
Assessment of the reliability of milk fat and protein contents as predictor of SARA

Milk recording database
780 000 analyses
360 000 cows (< 120 DIM)
6467 herds
Fat, protein, cells, milk production

3 indicators tested

Indicator 1 : Fat/Protein < 1 :

The cow is affected by SARA if fat/protein ratio is strictly lower than 1.

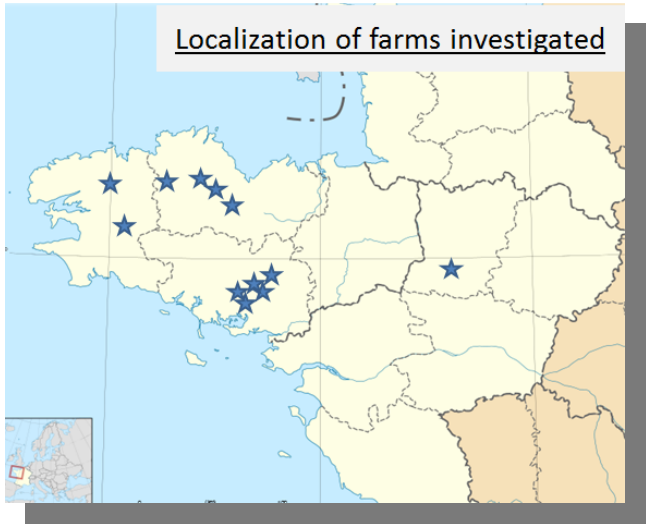
Indicator 2 : 0 < Fat - Protein < 3 :

The cow is affected by SARA if fat - protein is between 0 and 3.

Indicator 3 : Fat < 35 :

The cow is affected by SARA if fat rate is strictly lower than 35 g/kg of milk.

IV. RESULTS– PART 1



Number of herds : 12

Farm characteristics	Average	Min	Max
Number of cows	**63**	42	130
Productivity (kg)	**8966**	7422	10163

Number of cows: 144

Cow characteristics	Average	Min	Max
Number of lactations	**2,4**	1	>3
Days in milk	**90**	7	238
Daily milk production (kg)	**34**	16	55
Milk fat (g/kg)	**37**	21	65
Milk protein (g/kg)	**30**	22	37

IV. RESULTS – PART 1

SARA **< 5.5 <** **Marginal SARA** **< 5.8 <** **Normal situation**

Valid for the ruminocentesis method (Garret et al., 1999)

Necessary adaptation of pH thresholds for stomach tube method

Authors	pH difference
Hollberg (1984)	0.36
Rousseau et al (1989)	1.04
Brugère et al (1990)	0.97
Hofirek and Hass (2000)	0.7
Duffiel et al (2004)	0.35
Average difference: 0.68	

5.5 { (+0.4) SARA < 5.9 ; (+0.5) SARA < 6.0 ; (+0.6) SARA < 6.1 ; (+0.7) SARA < 6.2 }

Prevalence of SARA

			Thresholds			
pH class	Nb of cows	Nb of cows %	5.9	6.0	6.1	6.2
> 7	32	22.38 %	97.90 %	97.90 %	93.01 %	84.61 %
]6.8-7.0]	44	30.77 %				
]6.5-6.8]	48	33.57 %				
]6.4-6.5]	9	6.29 %				13.29 %
]6.3-6.4]	7	4.90 %			6.99 %	
]6.2-6.3]	0	0.00 %		2.10 %		
]6.1-6.2]	3	2.10 %	2.10 %			2.10 %
]6.0-6.1]	0	0.00 %			0 %	
]5.9-6.0]	0	0.00 %		0 %		
<5.9	0	0.00 %	0 %			

SARA Marginal SARA Normal pH

➔ **Less than 3 % of the animals of the study present low pH characteristic of SARA**

IV. RESULTS – PART 1

Correlation observation of animals – ruminal pH:



No significant correlations

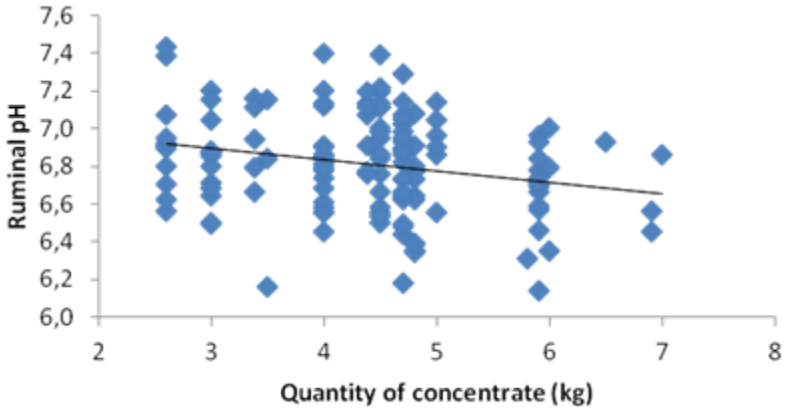
Significant correlation : -0,24

Correlation feeding – ruminal pH:

Different effects were studied:
-Type of ration
-Type of complementation
-Quantity of concentrate/feeding
-Method of distribution
-Straw incorporation
-Feeding refuse management
-Bicarbonate consumption

1 significant correlation:

Quantity of concentrate (-0,23)



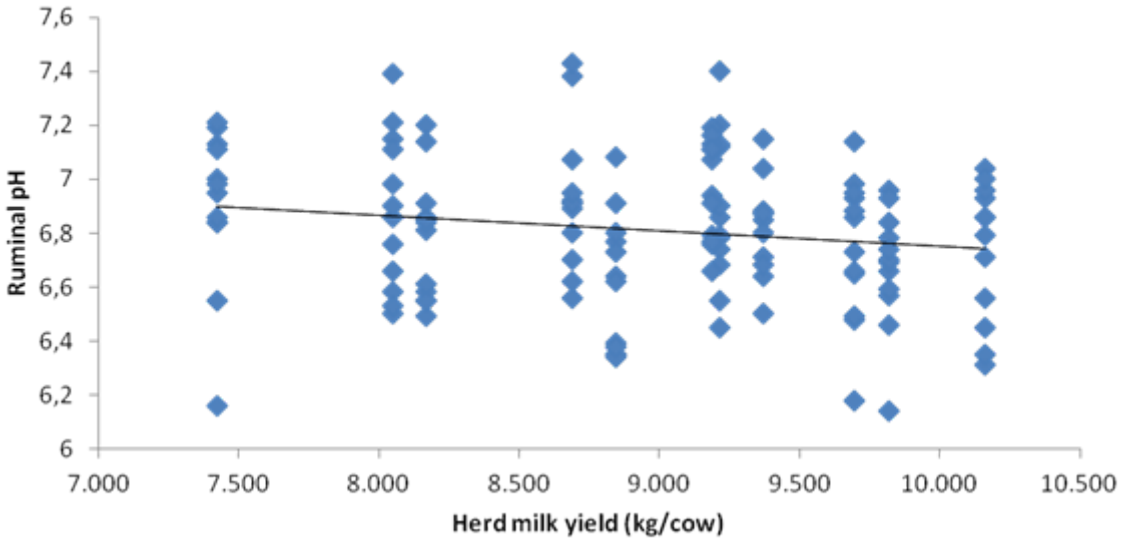
Bretagne Conseil Elevage Ouest
Créateur de valeur, naturellement®

Correlation milk production – ruminal pH:

Individual level	Correlation with pH	P-value	significance
Milk production	0,077	0,381	NS
Milk Fat	0,039	0,658	NS
Milk Protein	-0,099	0,262	NS
Somatic Cell count	0,130	0,161	NS

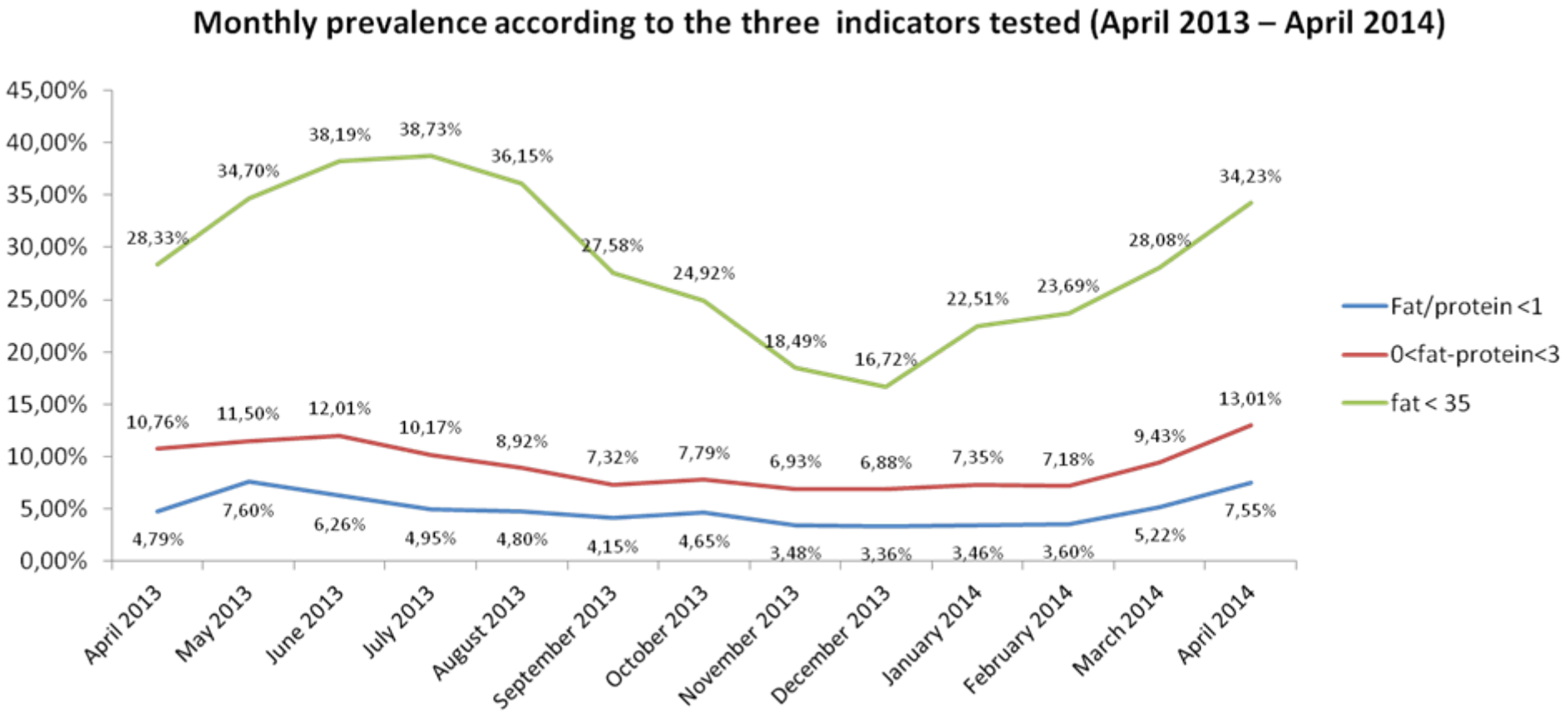
Herd level	Correlation with pH	P-value	significance
Herd milk yeld	**-0,173**	**0,048**	*

The increase of the herd milk yield induces a decrease of the ruminal pH …



IV. RESULTS – PART 2

Prevalence of SARA



➔ 4.6 % according to indicator 1

➔ 8.7 % according to indicator 2

➔ 27.1 % according to indicator 3

IV. RESULTS – PART 2

Sensitivity – specificity of the three indicators

Gold standard = ruminal pH
Cow is affected by SARA if pH < 6,5

143 ruminal PH data (17 < 6,5)

		pH		Predictive quality	
		> = 6,5	< 6,5	Sensitivity	Specificity
Fat/protein <1	-	116	16	6%	92%
	SARA	10	1		
0< fat – protein <3	-	106	13	24%	84%
	SARA	20	4		
Fat <35	-	77	10	41%	61%
	SARA	49	7		
Total		126	17		

➔ **Insufficient predictive quality to detect animals with lower ruminal pH**

V. DISCUSSION

➔ Low prevalence in our population *(Mannessiez, 2009)*

➔ Few observable signs on cows with low ruminal pH *(Tajik et al, 2009)*

➔ Quantity of concentrates and milk yields = risk factors *(Plaizier et al, 2009)*

➔ No link between ruminal pH and milk fat content *(Rollin, 2013)*

Part 1

Part 2

➔ Large variations of prevalence according to the three indicators

➔ Predictive qualities seem insufficient

V. DISCUSSION & CONCLUSION

Bretagne Conseil Elevage Ouest
Créateur de valeur, naturellement®

Principal limits of the study

- Choice of the herds investigated
- Method of collection of the ruminal fluid sample
- Number of herds and cows studied

Ways for improvements

- To study farms with unexplained bad performances
- To use other methods of measurement to get the ruminal pH
- To increase the number of investigated herds and cows

New knowledge, but also new questions …

Bretagne Conseil Elevage Ouest

Créateur de valeur, naturellement®

Thank you for listening