



# Occurrence of mastitis around insemination reduces establishment of pregnancy

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Fertility is a key parameter for dairy industry profitability

Fertility decreased linearly year after year:

- Increase in milk production
- Changes in genetics
- Changes in environmental background
- Interaction with other disorders?
  - ✓ Metabolic disorders and other nutritional issues
  - ✓ Inflammatory status of the animals

Is this relationship direct,  
or indirect through the  
effect of common risk  
factors such as coverage of  
energy?

## Conception and udder health:

- Genetic correlation = **0.30** (Pritchard, 2012) **0.19** (Koeck, 2012)
- OR = **0.85** (FSCR; Pinedo, 2009), **0.58-0.85** (CR; Hudson, 2012)

## Conception and subclinical ketosis:

- Few epidemiologic data
- OR = **0.60 - 0.70** ... no adjustment with co-variates (Raboisson 2014)

## Objective :

Analyze the relationship between udder health and conception, and its interaction with subclinical ketosis

- Data

- National French dairy milk improvement system
- Data on AI

**2008 - 2012**

- Variables calculated

- Conception at 1<sup>st</sup> AI or at all AI
- Somatic cell count around AI

**LL:** Cows with **L**ow SCC before and after AI

**LH:** Cows with **L**ow SCC bef. And **H**igh SCC aft. AI

**HL:** Cows with **H**igh SCC bef. And **L**ow SCC aft. AI

**HH:** Cows with **H**igh SCC before and after AI

**Threshold: 200 x 10<sup>3</sup>**

- Proxy of subclinical ketosis : fat, protein or F:P ratio (various thresholds)
- DIM, Parity, Milk Yield

- Statistical model:

Conception  $\sim$  SCC + SubKet + DIM + Yield + Parity | Herd

- Methods:

Step 1: Generalized additive mixed model:

- All variables are included as smooth terms
- Identify the shape of the relationship
- Allow to define the best thresholds

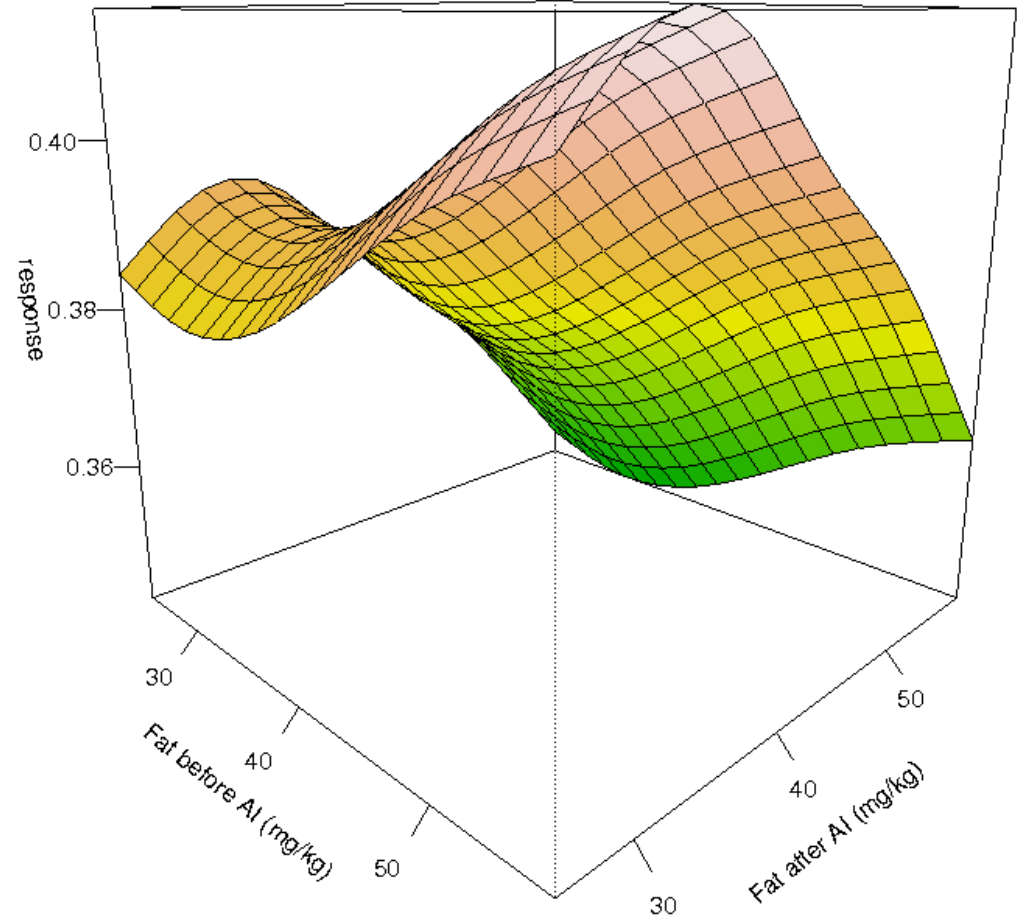
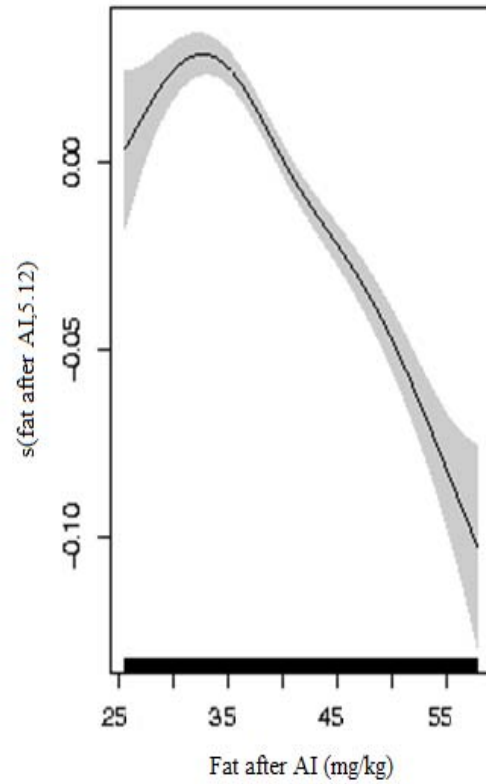
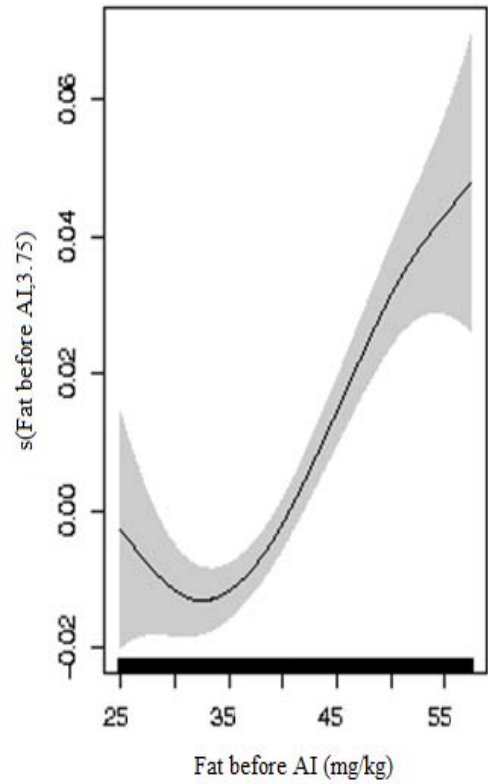
R software

Step 2: Mixed binomial model:

- Modified Poisson correction to obtain RR (Ospina, 2012)
- With or without the variable ketosis and the interaction
- For subpopulation with and without ketosis

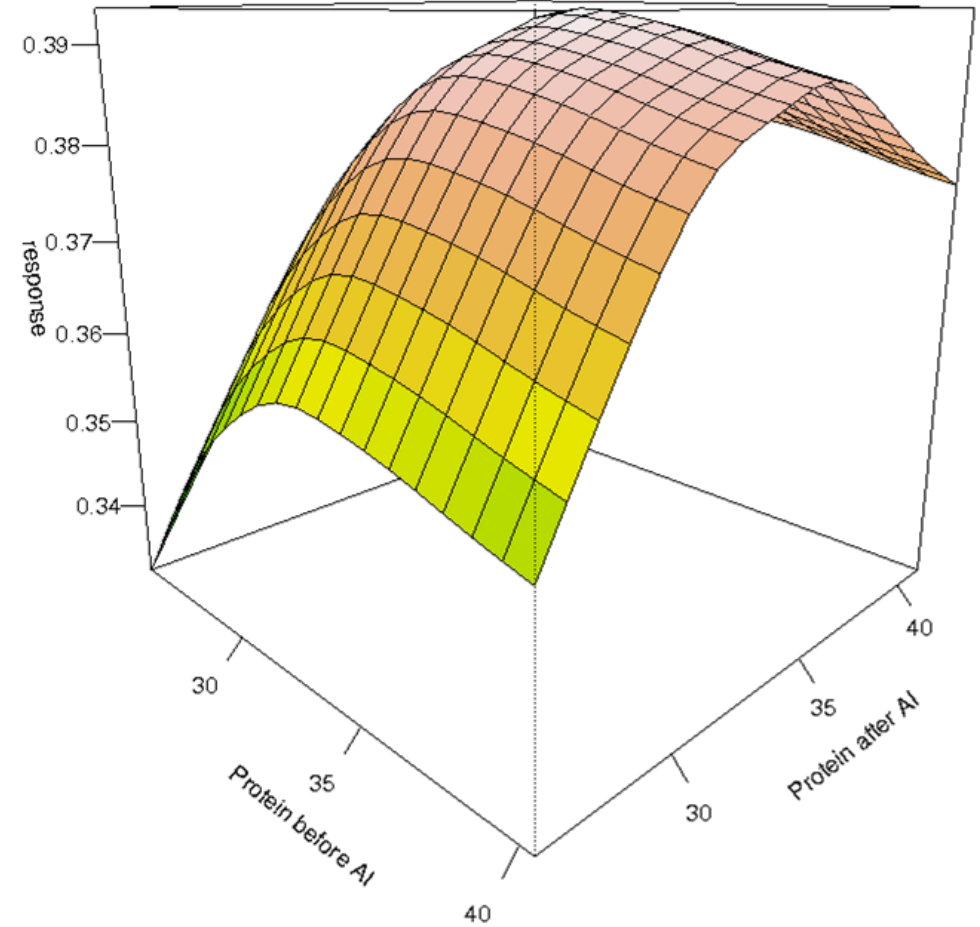
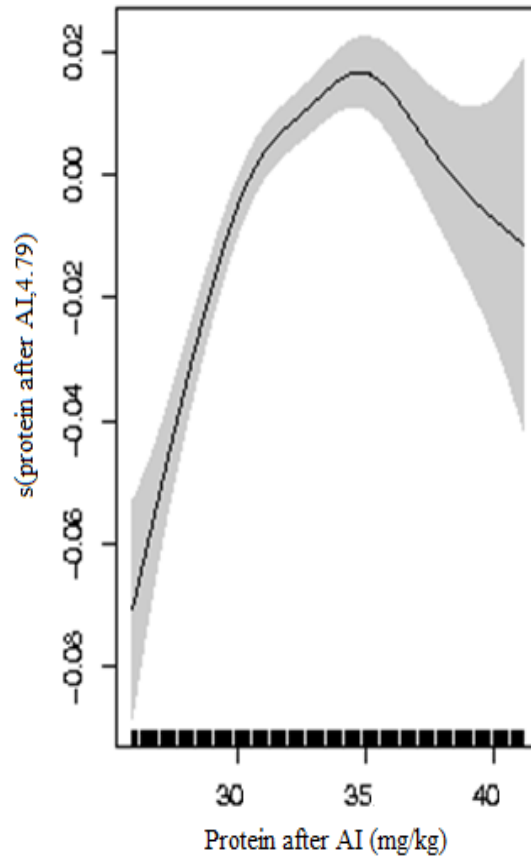
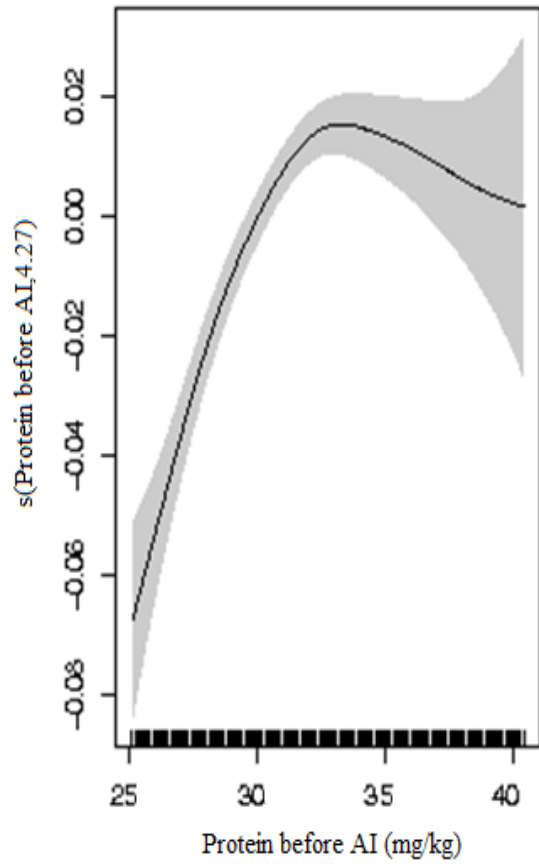
## Fat content and conception rate:

2008



## Protein content and conception rate:

2008



**Sub. Ketosis** Fat bef. AI  $\geq 45$  and protein bef. AI  $< 28$

**No Sub. Ketosis** Fat bef. AI between 35 and 44.9 and protein bef. AI  $> 32$

Model	RR (95%CI) of conception			Sub. Ketosis
	SCC class compared to LL group			
	LH	HL	HH	
SCC All population	<b>0.86</b> (0.84-0.87)	<b>0.98</b> (0.96-1.00)	<b>0.85</b> (0.84-0.87)	
SCC Population no Sub. Ket	<b>0.86</b> (0.84-0.88)	<b>0.98</b> (0.96-1.00)	<b>0.85</b> (0.84-0.87)	
SCC Population with Sub. Ket	<b>0.74</b> (0.65-0.84)	<b>0.97</b> (0.87-1.08)	<b>0.80</b> (0.72-0.89)	
SCC + Sub. Ket	<b>0.86</b> (0.84-0.87)	<b>0.98</b> (0.96-1.00)	<b>0.85</b> (0.84-0.86)	<b>0.87</b> (0.84-0.90)
SCC + Sub. Ket	<b>0.86</b> (0.84-0.88)	<b>0.98</b> (0.96-1.00)	<b>0.85</b> (0.84-0.87)	<b>0.88</b> (0.85-0.92)
+ Interaction	<b>0.86</b> (0.76-0.98)	<b>0.98</b> (0.88-1.10)	<b>0.94</b> (0.85-1.05)	



## Conclusion

- Conception of all AI and conception at first AI success is reduced by around **13 to 18 %** for cows with high SCC or with an increase of SCC around AI
- This decrease was up to **2 times higher** in cows with ketosis
- Inconsistency comes from structure of data and definition of subclinical ketosis

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# Thanks for your attention