



## Identification and Ranking of risk factors for somatic cell count economic penalty in 349 southern Belgium dairy farms



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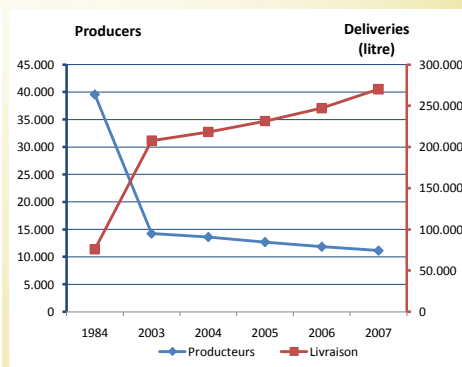
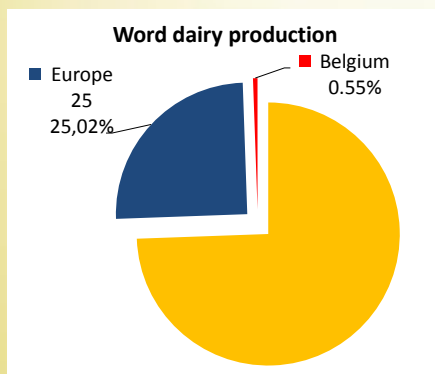
Understanding the field  
A short who's who...



## BELGIUM DAIRY FIGURES

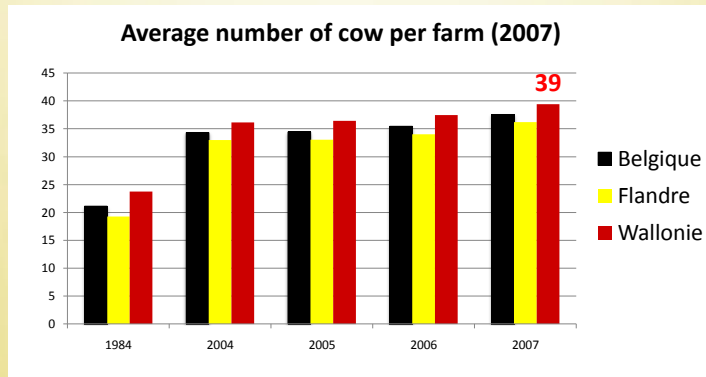


## Who's who



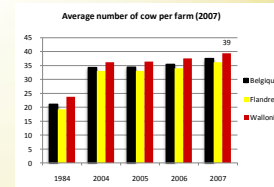
Belgian dairy industry confederation, Annual report 2007

## Who's who



*Belgian dairy industry confederation, Annual report 2007*

## Who's who



- 500.000 dairy cows= 3.000.000 tonns of milk
  - 13200 Producers
  - 220.000 in Wallonia = 5500 producers
  - 270.000 liters / dairy farm
  - 6.000 liters / cow
- **1407 farms following dairy health improvement controls**

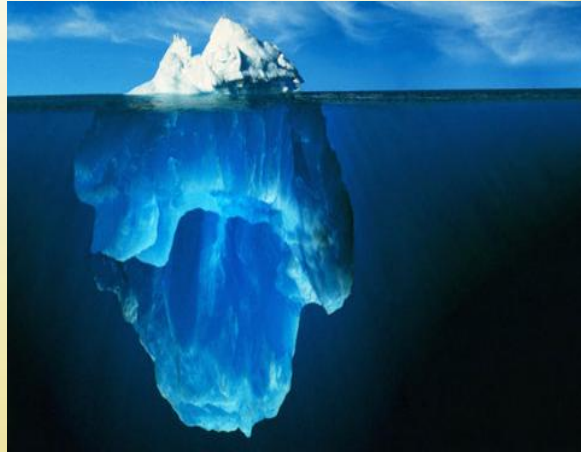
*Walloon Herd Association, annual statistics 2007*



## Field dairy health indexes

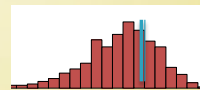
### Somatic cell counts (SCC)

- Bulk milk SCC
  - 268.000 cells/ml
- Herd SCC
  - 279.000 cells/ml
- IMM (LC) Tubes
  - Wallonia 400.000
  - Flanders (400.000)



## Purpose of study

- Build a dairy practices standardized survey
- Select a stratified randomised sample
- Report the most used practices
- Compare the variables to a threshold
- Use a multivariate logistic analysis
- Identify risk indicators of SCC penalty





## Recording dairy practices

- Udder health audit
  - Farm general information
    - Contacts, level of production, herd structure etc...
  - Milking
    - Organisation, duration, practices, teat lesions, milking machine tests...
  - Housing (for heifers, lactating and dry cows)
    - Type of housing, environmental factors...
  - Herd management
    - Nutrition, treatment practices, other factors...
  - Farmer opinion on herd udder health
- 2 surveyors recorded practices in 349 farms



## Recording dairy practices

- Audit (extract)

Nettoyage du pis et du trayon

→ Nettoyage →  Non

→  Systématique →  Pis et trayons  Trayons

→  Si sales

→  A sec Au moyen de →  Serviettes en papier  Serviette en tissu  serviettes désinfectantes

→  A l'eau Au moyen de →  Serviettes individuelles  Serviette collective

→  A l'eau →  Douchette  Serviettes en papier  Serviette en tissu  brosse automatique

→  Serviettes individuelles  Serviette collective

→ Désinfectant/savon  Non  Oui → nom \_\_\_\_\_

→ Essuyage  Non

→  Systématique  Occasionnel

→ lavette/serviette  Individuelle  Collective

→  Papier  Tissue

→ Prétrempage des trayons →  Jamais  Occasionnellement  Systématiquement → Produit : \_\_\_\_\_

→  Vaches à TC élevé  Vaches à mammites

→ Élimination des 1<sup>er</sup> jets? →  Jamais  Occasionnellement  Systématiquement → Où :  Main  A terre  Pot (fond noir)  Autre

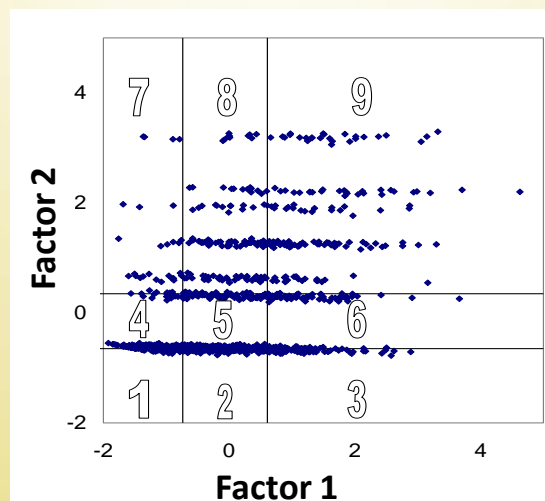
→ Palpation du quartier →  Jamais  Occasionnellement  Systématiquement

## Sampling method

- Random sample from DHI database
  - 1303 farms with at least 20 cows
- Principal component analysis
  - 4 characters :
    - Mean annual cellular score
    - % of time herd SCC over 400.000
    - Mean % of animals over 400.000 during lactation
    - Mean % of animals already over 400.000 during previous lactation
- Proportional repartition between provinces

*Jolliffe, 2002*

## Sampling method (PCA)



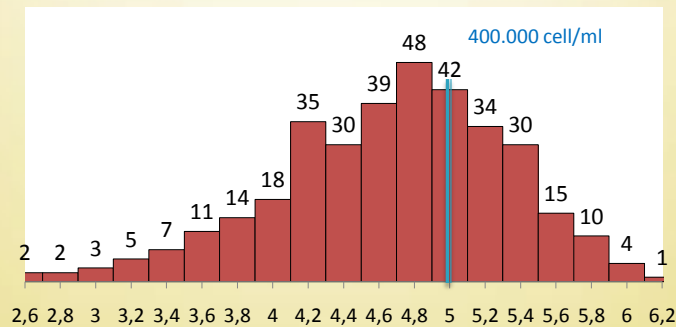
## Data analysis

- Y variable = last 3 months SCC geometrical mean
- 205 variables selected
- Univariate analysis and multivariate logistic regression
- Threshold choosen : 400.000 cells/ml

$$\text{logit} [P(Y = 1|X = x)] = \ln \frac{p(Y = 1|X = x)}{1 - p(Y = 1|X = x)} = \beta_0 + \beta_1 X$$

## Data set

Somatic cell score of the sample





## Data set

	minimum	mean	median	maximum	S.D.	N
Cow average daily production	7.90	<b>24.09</b>	24.60	38.60	5.15	349
% Fat matter	2.85	<b>4.06</b>	4.04	4.99	0.33	349
% Protein	2.86	<b>3.33</b>	3.32	4.12	0.15	349
Urea (g/ml)	19	<b>230.57</b>	232	518	74.67	349
Herd average lactation number	1.3	<b>2.65</b>	2.6	4.5	0.44	349
Herd average age	35.9	<b>52.67</b>	52.3	77.7	6.67	349
Number of lactating cows	15	<b>50.45</b>	46	169	22.26	349
% of primiparous cows	2.3	<b>33.02</b>	32.3	66.6	9.92	349
Number of dry cows	0	<b>6.15</b>	5	30	4.89	349
Total dairy quota	105000	<b>377523</b>	324636	1380000	192830	349
Last 3 month SCC geometric mean	73.00	<b>287.88</b>	272.00	807.00	124.06	349
Number of milked aside cows	0	<b>1.70</b>	1	16	2.14	349
% of animal over 400.000 cells/ml	0%	<b>27%</b>	26%	75%	13%	349
Calving interval	311.00	<b>418.11</b>	414.00	557.00	30.91	349



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*Distribution statistically identical to population ( $p < 0,05$ )*





## UNIVARIATE ANALYSIS

Vars	value	Mean HESCC (*1000 cell/ml)	Variation (*1000 cell/ml)
Type de housing	Cubicles	258 <sup>b</sup>	71
	Tight	287 <sup>ab</sup>	
	Strawed	→ 329 <sup>a</sup>	
Lactation number			
Calving pen	Yes	→ 259 <sup>b</sup>	44
	No	303 <sup>a</sup>	
Dairy production	r = -0.24		
Teats desinfection	Occasionnal	239 <sup>b</sup>	79
	Systematic	286 <sup>ab</sup>	
	Never	→ 318 <sup>a</sup>	
Type of post-dipping	Spray	249 <sup>a</sup>	142
	No reflux cup	274 <sup>a</sup>	
	Default cup	→ 391 <sup>b</sup>	
Grass silage	yes	→ 282 <sup>a</sup>	90
	No	372 <sup>b</sup>	
Shearing cows	Yes	→ 273 <sup>a</sup>	37
	No	310 <sup>b</sup>	
Post-dip	Yes	→ 275 <sup>b</sup>	38
	No	313 <sup>a</sup>	
% of Primiparous	r = -0.14		

Stripping at the end of lactation	No →	272 <sup>a</sup>	47
	Systematic	297 <sup>ab</sup>	
	Occasionnal	319 <sup>b</sup>	
Pulsator type	Individual →	279 <sup>a</sup>	42
	Multipost	321 <sup>b</sup>	
Number of claws by milker	>10 !	254 <sup>b</sup>	40
	<10	294 <sup>a</sup>	
Identification of « problem cows »	Oui →	279 <sup>b</sup>	38
	Non	317 <sup>a</sup>	
Period of reintroduction of dry cows	> 1.5 week before calving →	214 <sup>b</sup>	100
	At calving	289 <sup>a</sup>	
	< 1.5 week before calving	314 <sup>a</sup>	
Surface type	Slatedfloor →	271 <sup>a</sup>	36
	Concrete	307 <sup>b</sup>	
Liner cleanliness	Clean →	283 <sup>a</sup>	55
	Dirty	338 <sup>b</sup>	
Pre-dip	No	283 <sup>a</sup>	- 57
	Yes →	340 <sup>b</sup>	
Foremilk check	Never	272 <sup>a</sup>	52
	Systematic	281 <sup>a</sup>	
	Occasionnal →	324 <sup>b</sup>	

## Under Pressure...

- Infectious pressure
  - 25% of cows with 1 check over 400.000
  - 12% of them were already signaled at previous lactation
- Weakness of physical defenses
  - Teat lesions
    - Hyperkeratosis 20%
    - Oedema 20% → Some 75-80%
    - Wet teats 25%



## MULTIVARIATE ANALYSIS



### Multivariate analysis ( $p < 0,05$ )

Category	Variable	Values	Odds-ratio
General information	Herd production	Mean milk production/animal	0,95
	Herd structure	% of primiparous	0,97

Raubertas et Shook, 1982



## Multivariate analysis ( $p < 0,05$ )

Category	Variable	Values	Odds-ratio
General information	Herd production	Mean milk production/animal	<b>0,95</b>
	Herd structure	% of primiparous	<b>0,97</b>
Management	Calving pen	Absence vs presence	<b>2,49</b>

Bareille *et al.*, 2000



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Housing	Type of housing	Tighten vs cubicles	<b>1,73</b>
		Strawed vs cubicles	<b>2,36</b>
		Meadows vs Cubicles	<b>1,92</b>

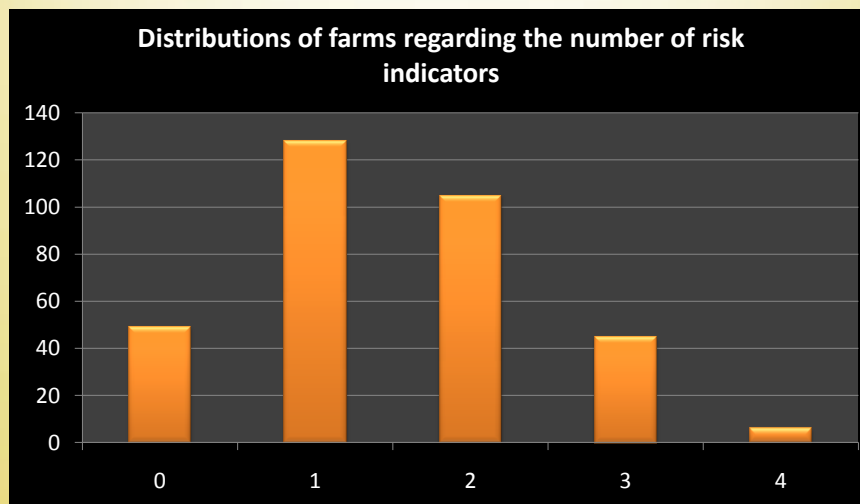
Fourichon *et al.*, 2000; Peeler *et al.*, 2000

## Multivariate analysis ( $p < 0,05$ )

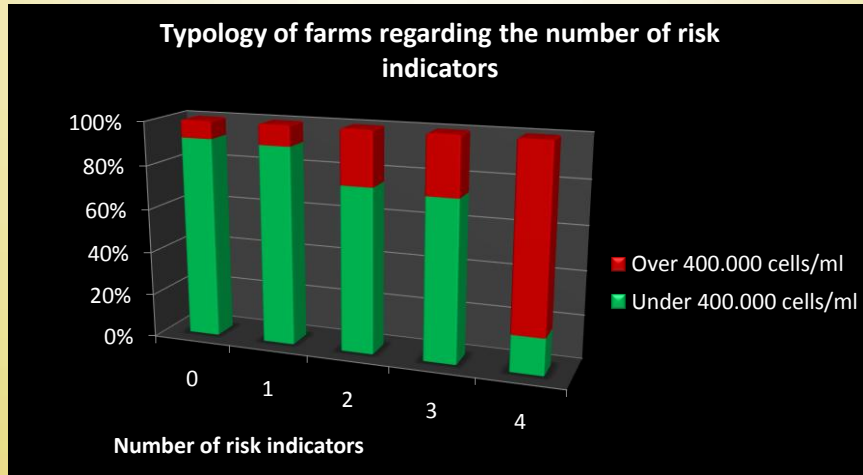
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		Strawed vs cubicles	2,36
		Meadows vs Cubicles	1,92
Milking	Post dip	No vs yes	2.02
	Pre-dip	No vs yes	0.33
	Stripping	Systematic VS No	1.90
	Stripping	Occasional VS No	2.43
	Liner cleanliness	Clean VS Dirty	0.43

Natzke *et al.*, 1978; Osteras *et al.*, 1990 ; Isaksson et Lind, 1992; Hillerton *et al.*, 2000  
Riekerink et Barkema, 2006  
Faye *et al.*, 1994 ; Barnouin *et al.*, 2005

## Risk assesment



## Risk assesment

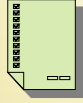


## Take home message



the horrible truth behind whipped cream  
L'horrible vérité sur la crème fouettée

## Take home message



- Structured udder health audit is the best approach to keep trace of dairy practices



- Most known risk factors are our best risk indicators



- Still need for technology transfer in the field

- **Cooperation between all dairy partners gives the best epidemiological view of the farm**



- **There's still a need for clinical data regarding mastitis**