Session 9

anne.relun@oniris-nantes.fr , anne.relun@inst-elevage.asso.fr

Digital dermatitis: the current state of knowledge

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Anne Relun, Raphaël Guatteo, Philippe Roussel, Nathalie Bareille
UMT Cattle Health Management (Livestock Institute - ONIRIS - INRA), France

Outline

- What is digital dermatitis ?
- How can we control it ?
- How can we detect it ?

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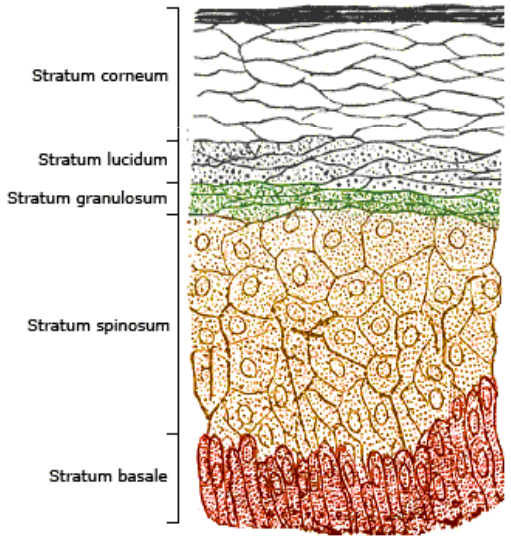
- How can we detect it ?

What is digital dermatitis?

"Hairy heel warts, Strawberry foot rot, Mortellaro disease …"

Digit*al*

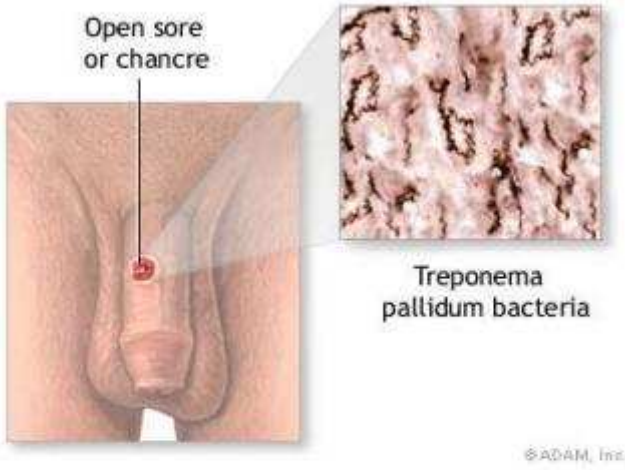


Derm*atitis*

What is digital dermatitis?

"A contagious disease characterized by a circumscribed superficial ulceration of the skin along the coronary band, commonly along the hair/horn junction of the rear feet" [Döpfer and Berry, 2008]

Like some human diseases ?



Syphilis

P. M. V. Martin ®

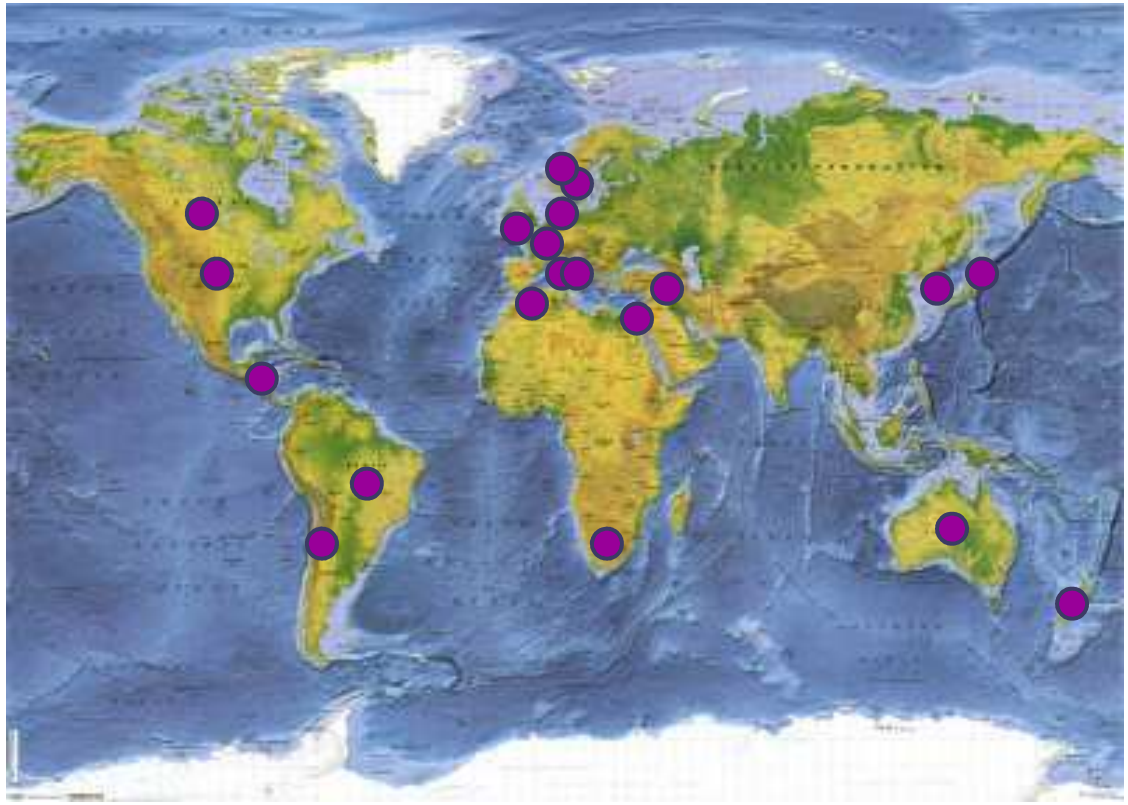
Yaws

T. pallidum pertenue

Widespread ?

1974: Italy
[Cheli and Mortellaro]

1980’: USA [Rebhurn et al]
UK [Blowey]



1990’:
Chile [Rodrigues-Lainz]
Brazil [Cruz]
France [Gourreau]
Japan [Kimura]
Korea [Jeong]
South Africa [Van Amstel]
Israel [Yeruham]
Australia [McLennan]
Canada [Borgmann]

2000’:
Greece [Katsoulos],
Sweden [Hillström],
Iran [Nowrouzian],
Morocco …

Widespread ?

18 – 90 % dairy farms are affected

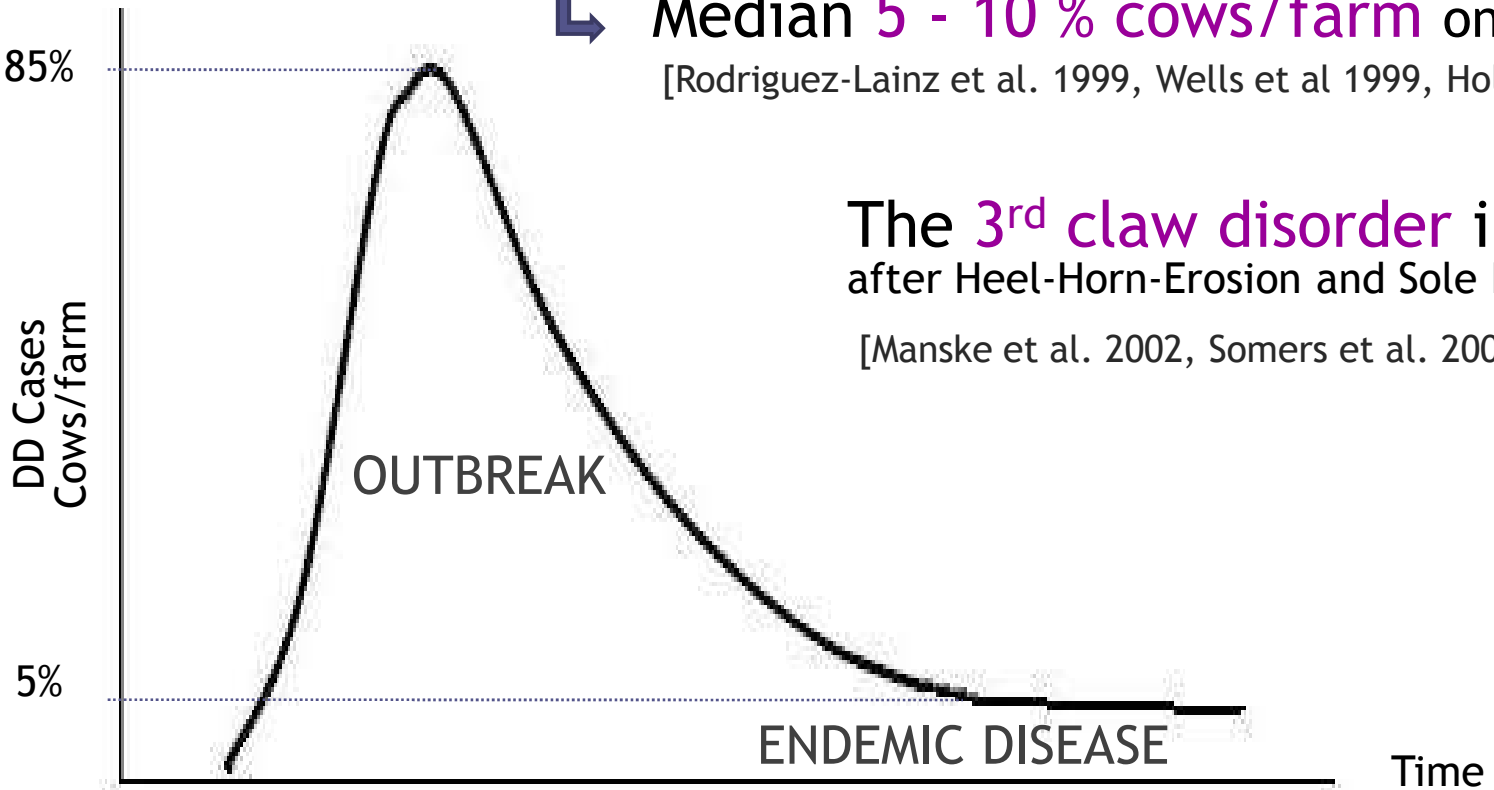
5 - 85 % cows within farm are affected

↳ Median 5 - 10 % cows/farm on a given day

[Rodriguez-Lainz et al. 1999, Wells et al 1999, Holzhauer et al. 2006])

The 3rd claw disorder in frequency
after Heel-Horn-Erosion and Sole Haemorrhage

[Manske et al. 2002, Somers et al. 2005, Waaij et al 2005])



Evolution of the proportion of affected cows within farm

Why should we care on it ?

Lameness

Decreased welfare

Challenges

Lameness

+

Contagiousness

Decreased production

\+ Cost of treatments

\+ Time-consuming

Economic losses

Challenges

Difficulties to control it

No eradication

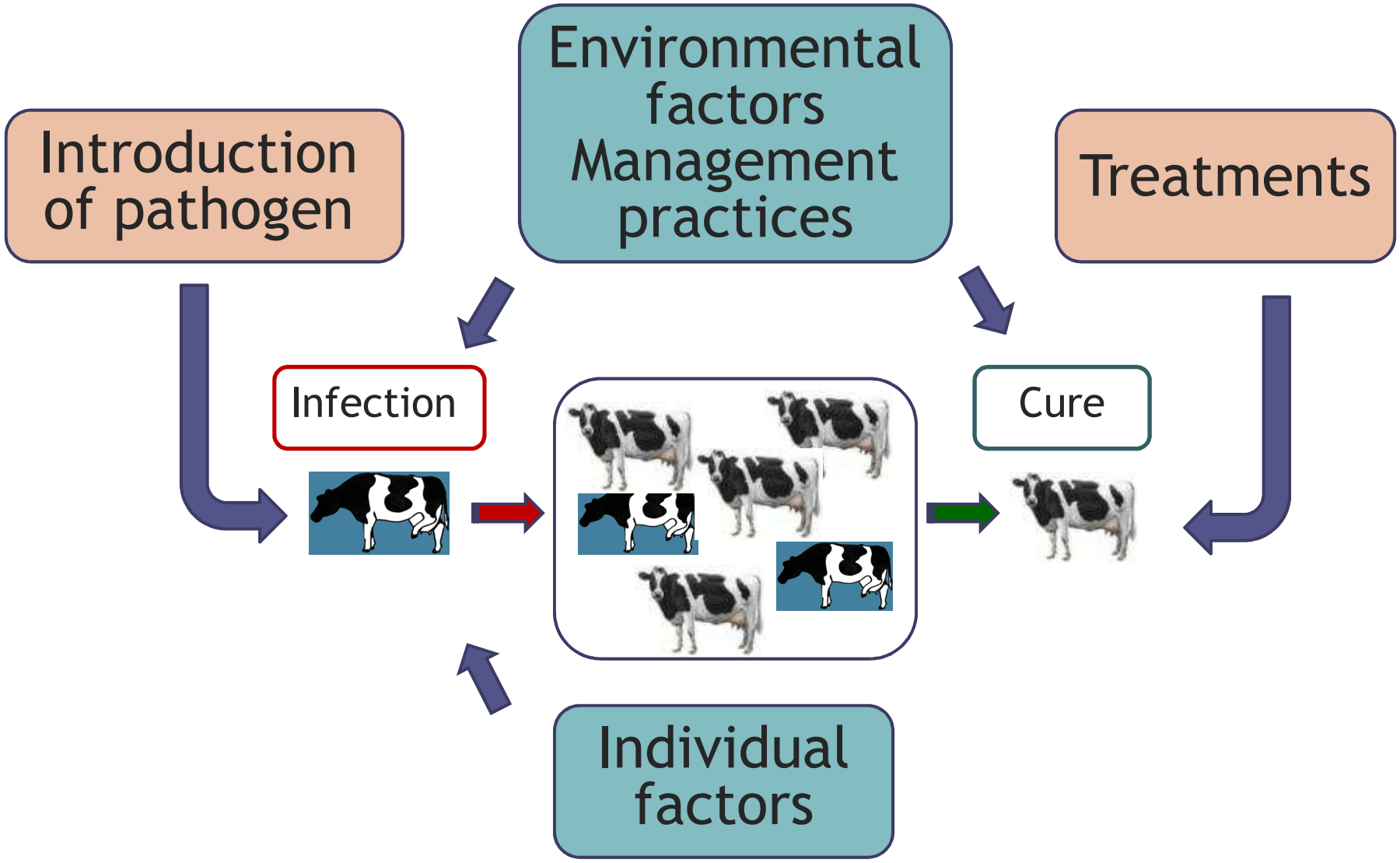
Variability of efficacy of treatments

Efficient substances might be forbidden

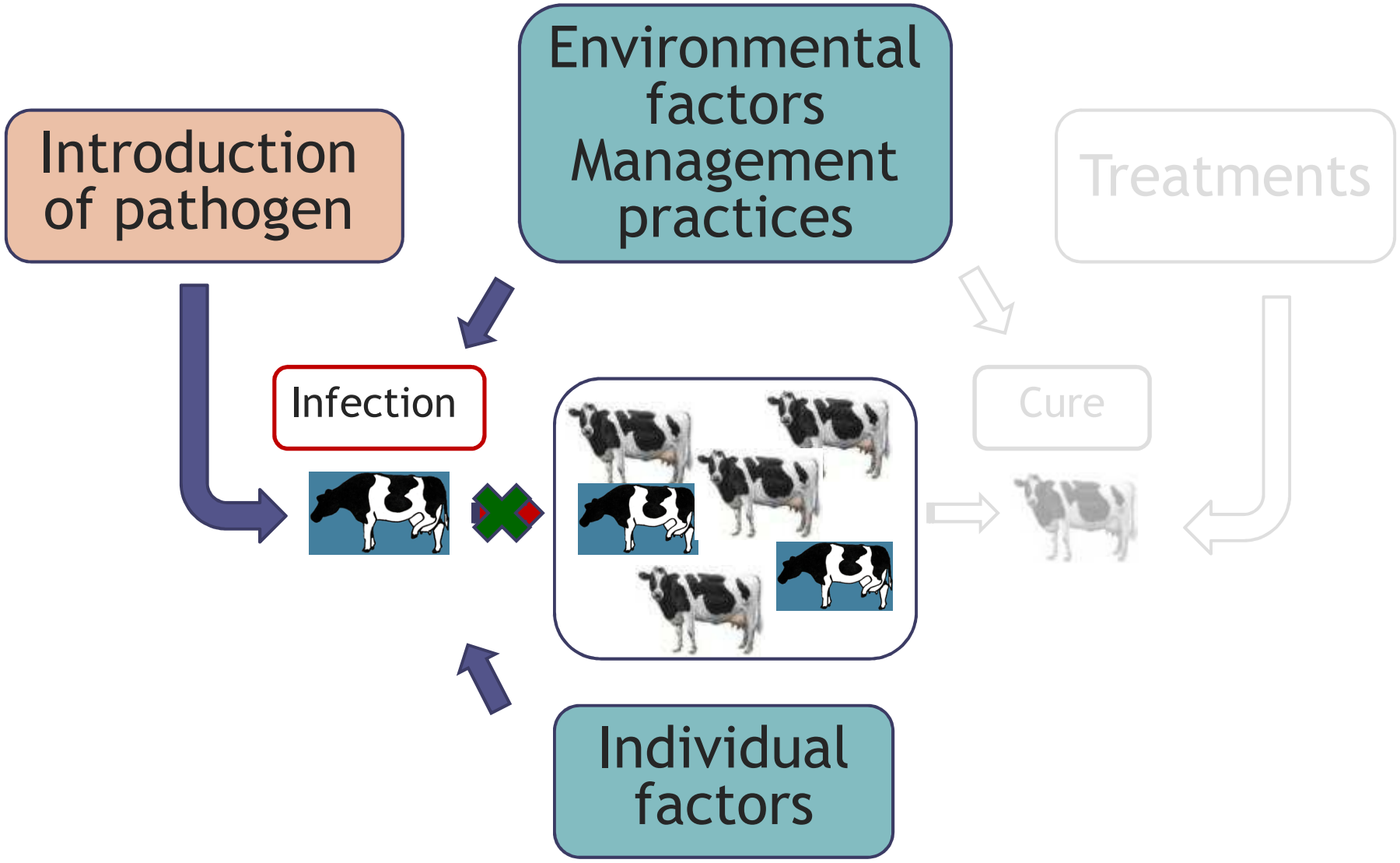
Outline

- What is digital dermatitis ?
- How can we control it ?
- How can we detect it ?

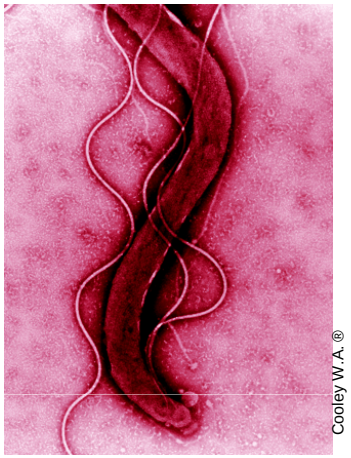
Key points for its control



Prevent infection ?



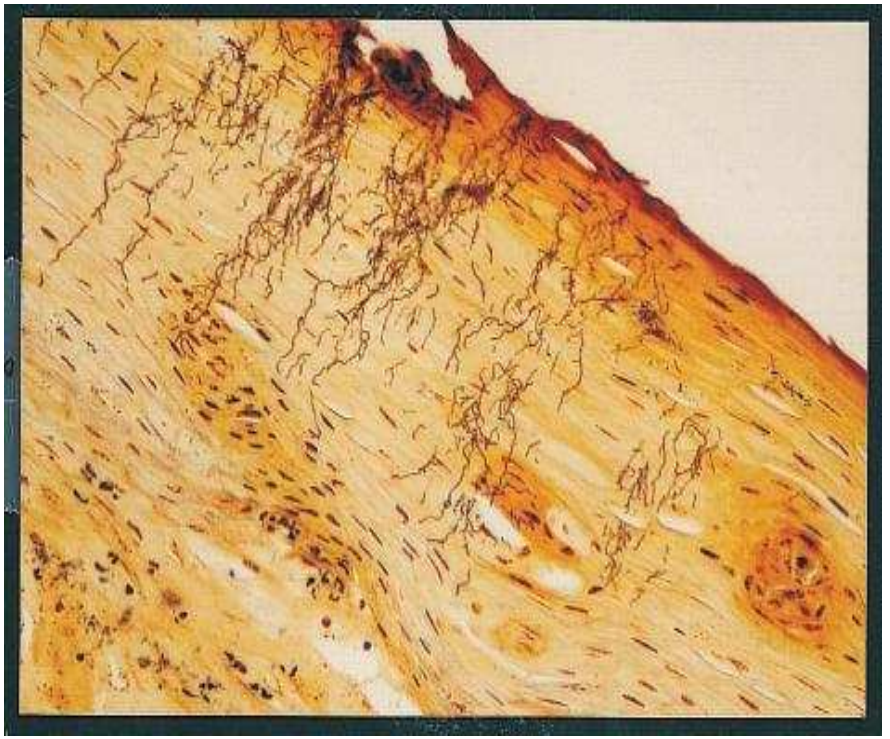
Which pathogens are involved ?



L: 5-16 mm,
D: 0.1-0.2 mm

Gram –

anaerobe



Treponema

T. vincentii/medium-like
T. phagedenis-like

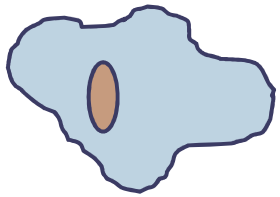
T. denticola,T. brennaborense, T. pedis
[Choi & al 1997; Cruz & al 2005; Evans & al 2009; Klitgaard & al. 2008; Nordhoff & al 2008; Yano & al 2009]

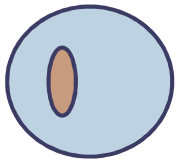
Other bacteria: *Guggenheimella bovis, Bacteroides, Campylobacter, Fusobacterium, Peptococcus sp.*

Is the immune system efficient ?

POORLY

Treponema → macrophages functions → Acquired immune response





Short duration of immune response [Trott et al. 2003]

→ Self-cure scarcely ever described
Frequent reoccurrence of DD
Vaccination not efficient

Sources of *Treponema*

Infected animals

+ *Sheep (footrot) ?*

+ *Gastro-intestinal tract ?*

Slurry and manure

Hoof trimming material

[Dhawi et al. 2005; Döpfer et al. 19997; Shibahara et al. 2002; Wells et al. 1999]

How do they enter the skin ?

Wet conditions

Trauma

"In experimental studies moisture and reduced access to air were **necessary** for successful transmission"
[Berry 2002]

Impact of the environment and management practices

Housing

- Cubicle > straw yards
- Concrete > slatted floor
- Automatic scrapers > tractors
- Limited access to pasture

Hoof trimming procedures

- > 12 months

Nutrition

- High concentrate feed intake at the beginning of lactation

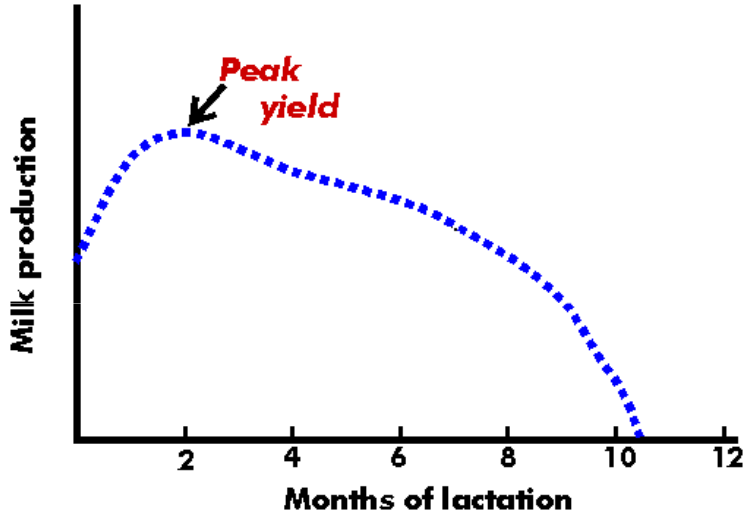
[Somers et al. 2003; Somers et al. 2005]

Are some animal more susceptible ?

Dairy breeds

First lactation

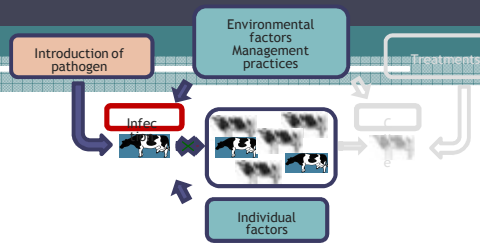
At the peak of lactation



Heifers of cows previously infected
(Heritability: 0.029 – 0.1)

[Onyiro et al. 2008; Somers et al. 2005; Waaij et al. 2005]

Prevent infection ?



Introduction of pathogen

Purchase DD-free cows
Cure DD cows
Disinfect hoof trimming material

Environmental factors Management practices

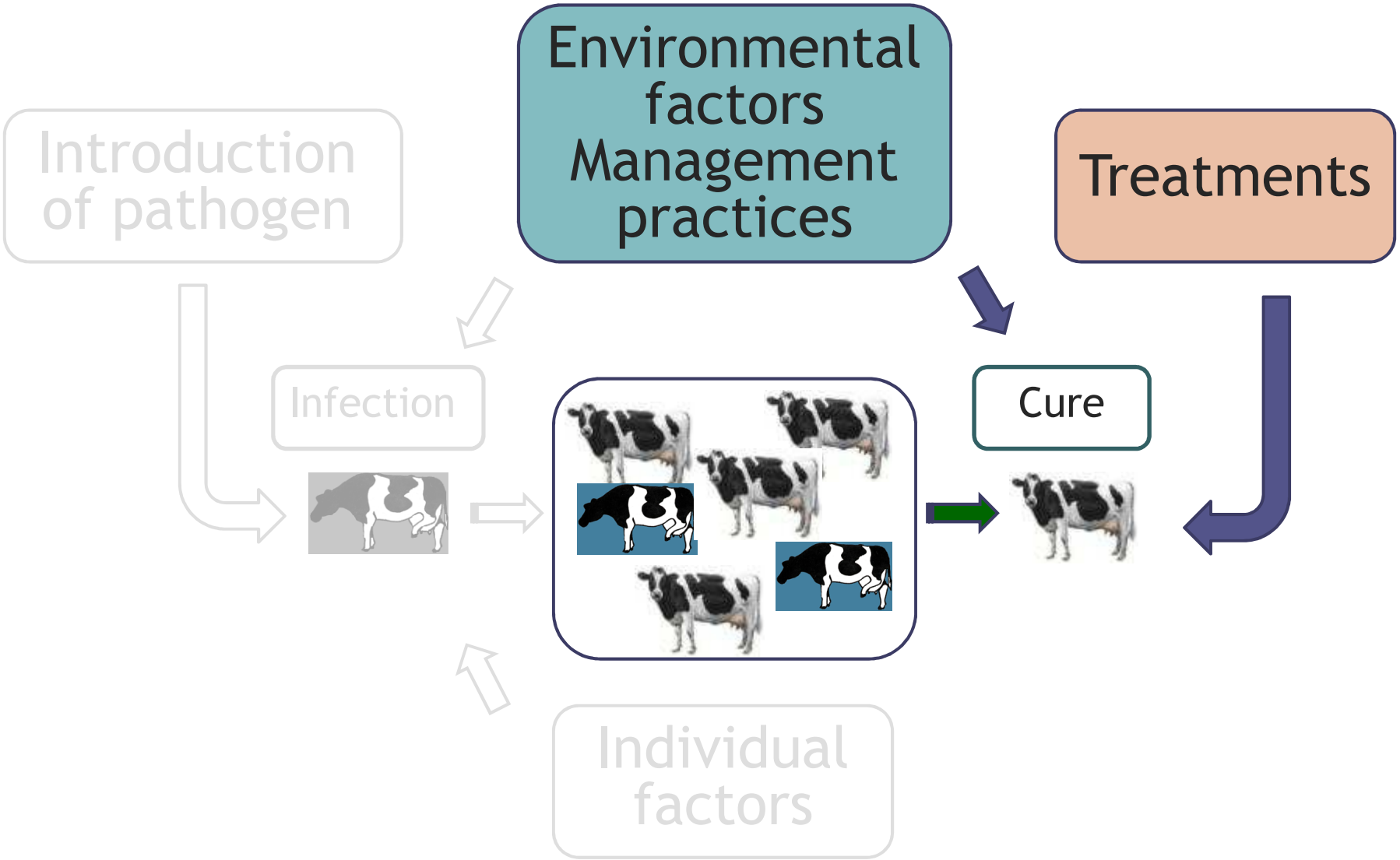
Provide a dry and non wounding environment

Hoof-trimming < 12 months

Individual factors

Select heifers from cows with no DD history

Improve cure rate ?



Which treatments are available ?

Individual treatments

Collective treatments

Individual treatments

Mostly antibiotics
Oxytetracycline – lincomycin, lincomycin/spectinomycin

Good curative efficacy in 2-3 d.
until 14–30 d. post treatment

Development of non antibiotics products, the most promising containing Cu

Individual treatments

No consensus on the best regimen

Best recovery if the lesion treated is

- early [Bathina et al 2002; Somers et al. 2005]
- cleaned [Kofler et al. 2004]
- above the heels or around the dewclaws [Hernandez and Shearer 2000]

Frequent relapses : 60% of successfully treated cows develop recurrent lesions in 7 to 15 weeks [Berry et al. 1999; Read and Walker 1994]

Time-consuming if prevalence is high

Collective treatments

Applied via footbath, sprayer or foam, mostly during milking

Collective treatments

Disinfectants, mostly containing Cu

Old products

Formaldehyde
2-10%

CuSO4
2-10%

* Not toxic for the environment at the current use in France [Relun et al. 2010]

CuSO4: 82 € HT/bag
1 722 € HT/ year (1 footbaths 5% 200 L /15 days)

New products

Multi-compounds containing Cu

Kling-on Blue ®

Pediline ®

Hoof-Fit ®

Hoof-Clear ®

Hoof Pro + ®

KoB: 97 € HT/bag
5 044 € HT/ year (1 footbaths 200 L /15 days)

Collective treatments: issues

Time and labour consuming

European directive on biocidal products 98/8/EC: evaluation needed for 2014

Lack of controlled trial

- Preventive effectiveness > curative ?
- Effectiveness variable depending on farms
- No consensus on the best regimen

New products = safer but quite expensive

On-going research

(UMT Cattle Health Management, Nantes, France)

Practical trial in 52 farms

Relevance of herd treatment

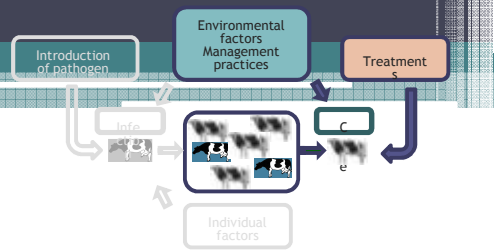
Evaluation of the curative and preventive effectiveness of different practical modalities of herd treatments

Taking into account the specific situation of their farm

(prevalence of DD, hygiene management, pasture management, facilities …)

Results expected in 2011

Improve the cure rate ?



Treatment

Treat lesions as early as possible

Clean the feet before treatment

Collective treatment with new disinfectants can be use but

Treat individually all lesions > 2 cm

Environmental factors Management practices

Provide a clean surface

Outline

- What is digital dermatitis ?
- How can we control it ?
- How can we detect it ?

Why should we detect DD ?

DD lesion

+-

Lameness

Should I treat this cow for DD ?

Could that cow transmit DD to others ?

Is this lesion responsible for lameness ?

Signs seen by farmers

Lameness

Reluctance to bear weight on the affected foot

Long hairs around a circumscribed skin lesion

NOT SUFFICIENT

Affected cows in early stage are mostly not lame

Long hairs can persist even if the lesion is cured

Course of a DD lesion

?

Pain, infectivity, treatment

			
Pain	+++	+-	-
Infectivity	+++	++	+-
Treatment	Individual	Individual Collective	Not needed but keep on watch

Which methods are used to detect DD ?

Serology not specific enough

Inspection of the feet

In a trimming chute
"Gold-standard"

Vink D. ®

In a standing cow

In a trimming chute

Best visualisation of the lesions
(interdigital space)

Exploration of other foot lesions

Time consuming

Stressful

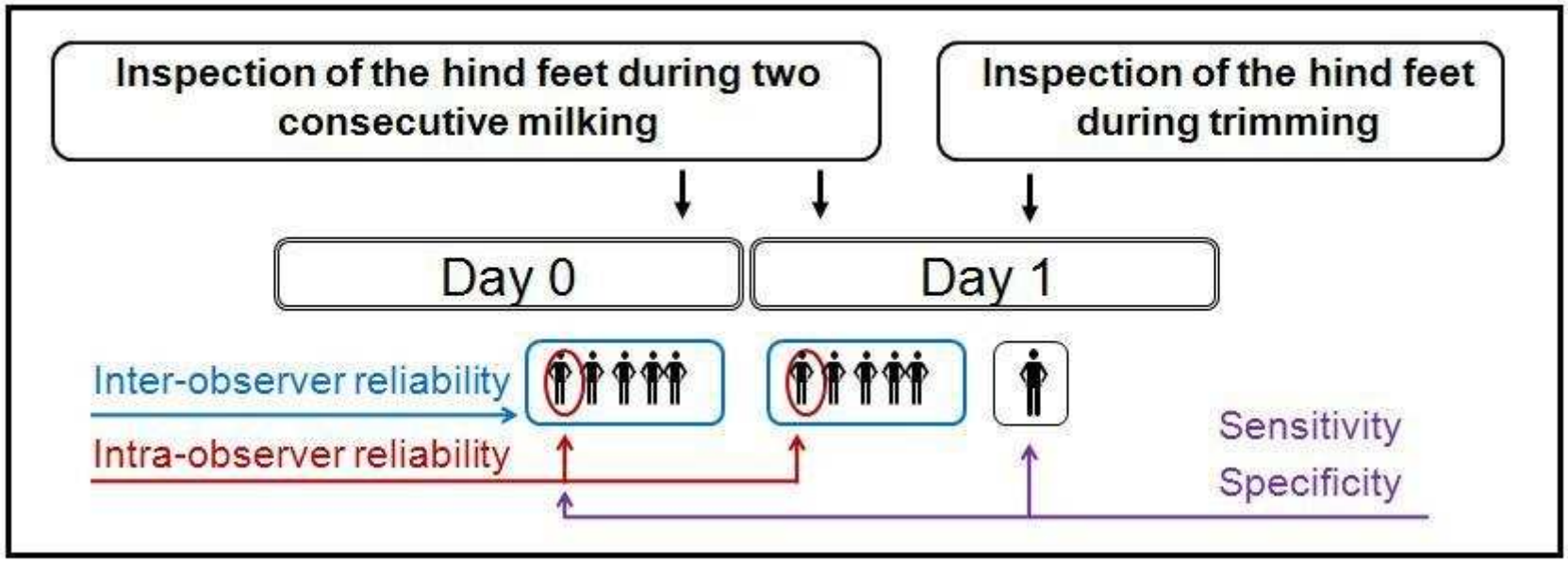
Quite expensive

Essential for the diagnostic of a lame cow

Not adapted for frequent evaluation of the DD status

With a swivelling mirror and a headlamp (standing cow)

Method evaluated during spring 2009



[Relun et al. 2010]

With a swivelling mirror and a headlamp (standing cow)

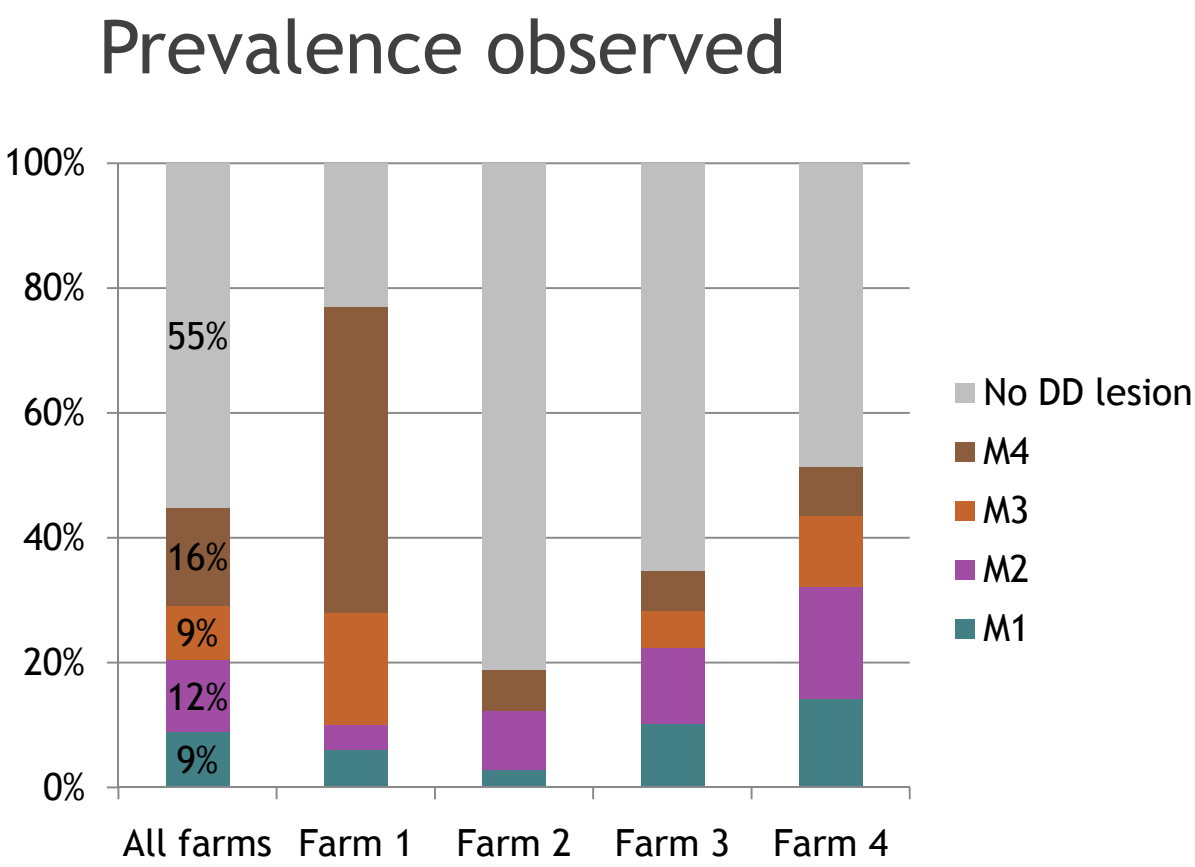
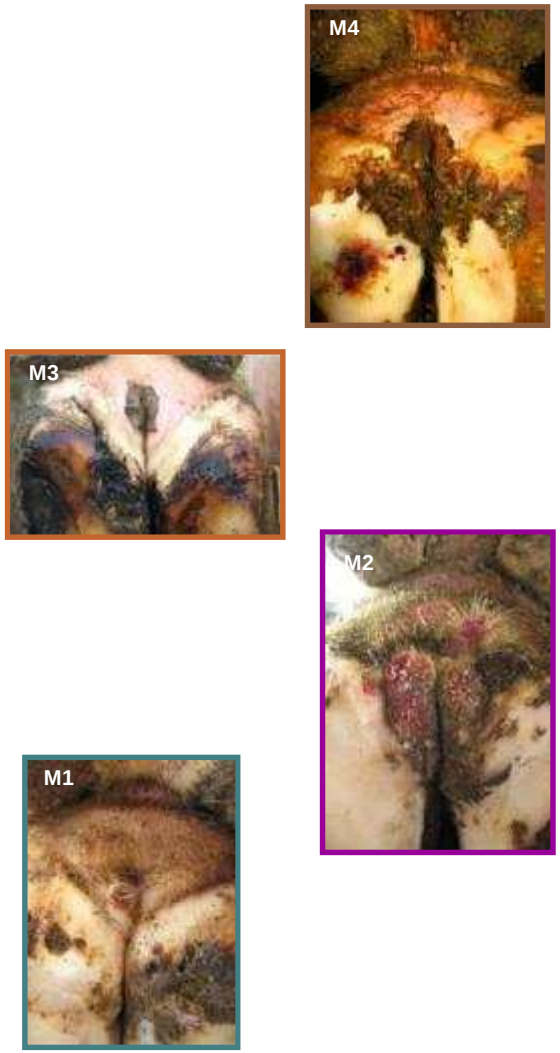


Figure. Percentage of M-stages observed on the hind feet during trimming for all farms and by farms

[Relun et al. 2010]



With a swivelling mirror and a headlamp (standing cow)

Method reliable with 4 M-stages (M0 – M1 – M2 – M34)

- Good agreement within observers (κ_w= 0.66)
- Good agreement between observers (κ_w= 0.61)
- Good sensitivity and moderate specificity (Se = 0.90; Sp = 0.80)

Compatible with a regular milking

Not expensive tools (mirror : 8.88 € ; headlamp : 29.18 €)

[Relun et al. 2010]

With a swivelling mirror and a headlamp (standing cow)

Good visualisation of the lesions

Time-friendly

Stress-friendly

Cost-friendly

Useful for research purposes and for day-to-day hoof health management

No visualisation of the interdigital space

No visualisation of other foot lesions

Not adapted for the diagnostic of a lame cow

What should a farmer do ?

Lameness

Yes

No

➡ Treat

➡ Treat Individually

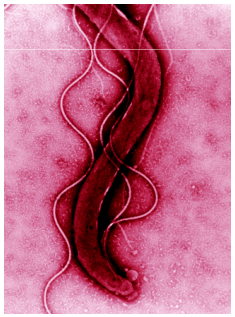
➡ Watch

DD lesion

Conclusion

A contagious disease

Pathogen necessary but not sufficient



Importance of environment and management practices

→ Most of dairy farms might get infected

With variations of prevalence and severity

Knowledge and prospects

Cure

Treatments

Early detection
Early treatment

Concomitant treatment of all affected cows

Best regimen

Effectiveness / price

Best regimen

Housing and management

Clean soils

Procedures

Regular hoof-trimming

DD Cases Cows/farm

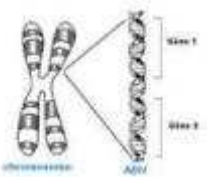
OUTBREAK

Prevent

ENDEMIC DISEASE

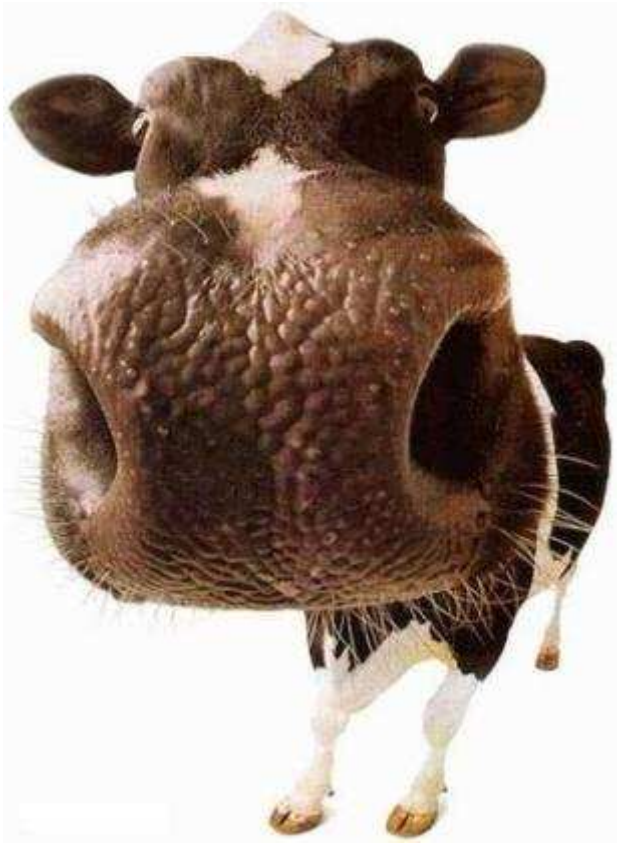
Time

Genetically resistant cattle

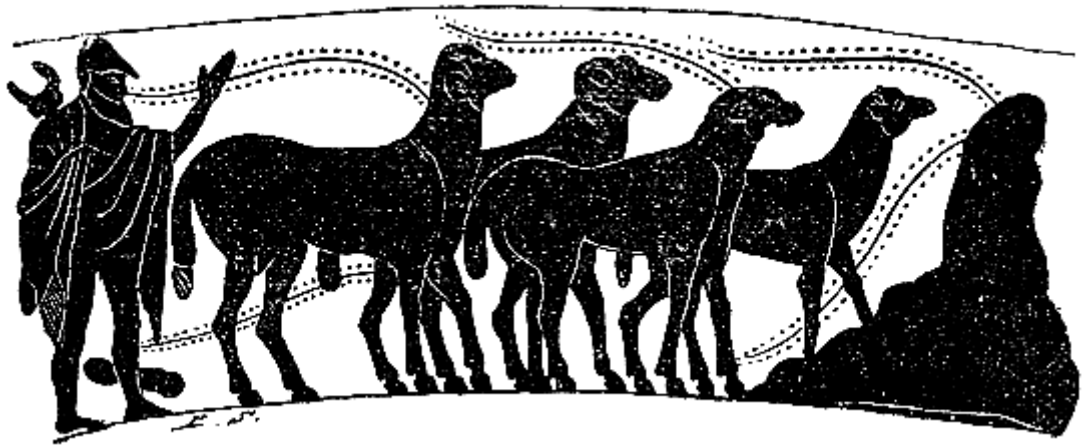


Impact of food and stress

Thanks for coming ….



Bonus …



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