Controling subclinical ketosis to reduce curative antibiotic use

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EBF 2015 Rome

15st october 2015

Subclinical ketosis of dairy cows

Placental retention ↑

Metritis ↑

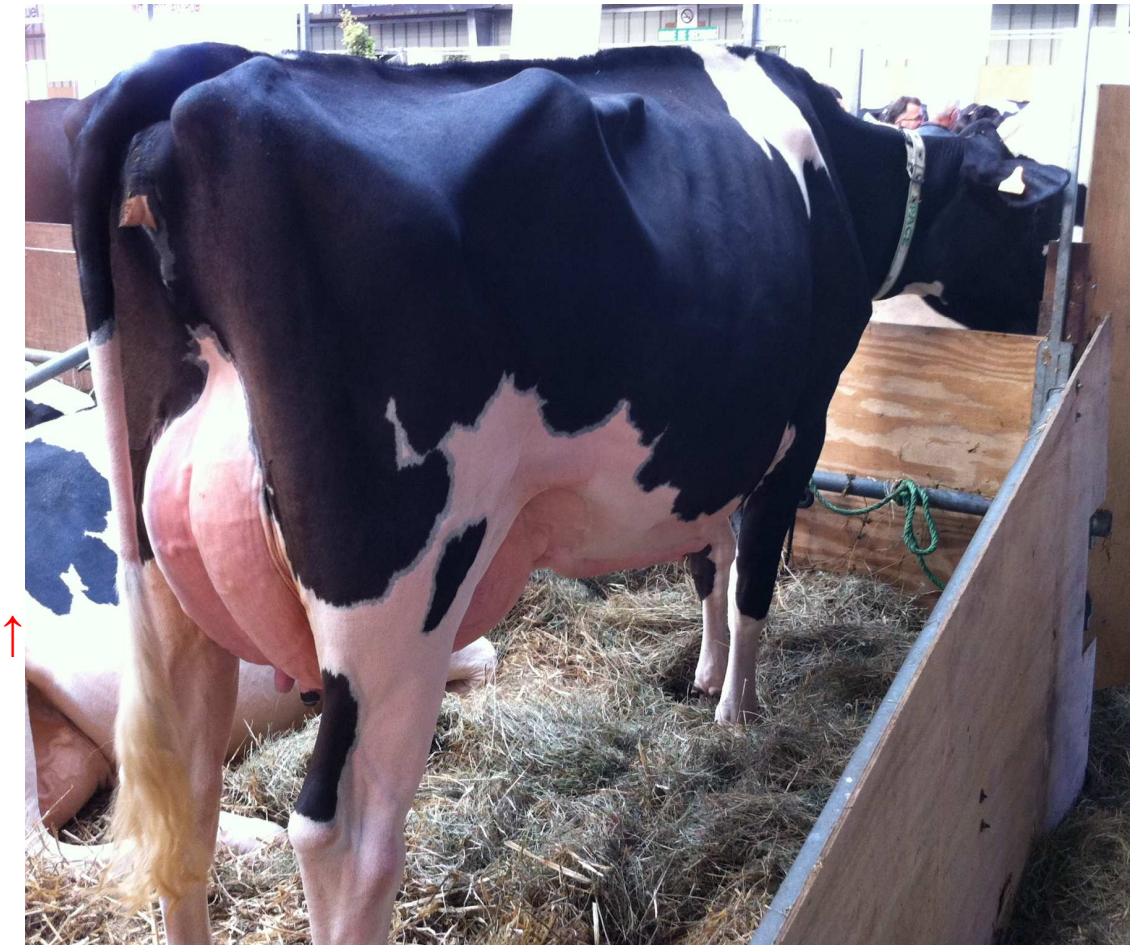
Reproduction performances ↓

Milk ↓

Clinical mastitis ↑

SCC ↑

Lameness ↑



Abomasum displacement ↑

Clinical ketosis ↑

Culling ↑

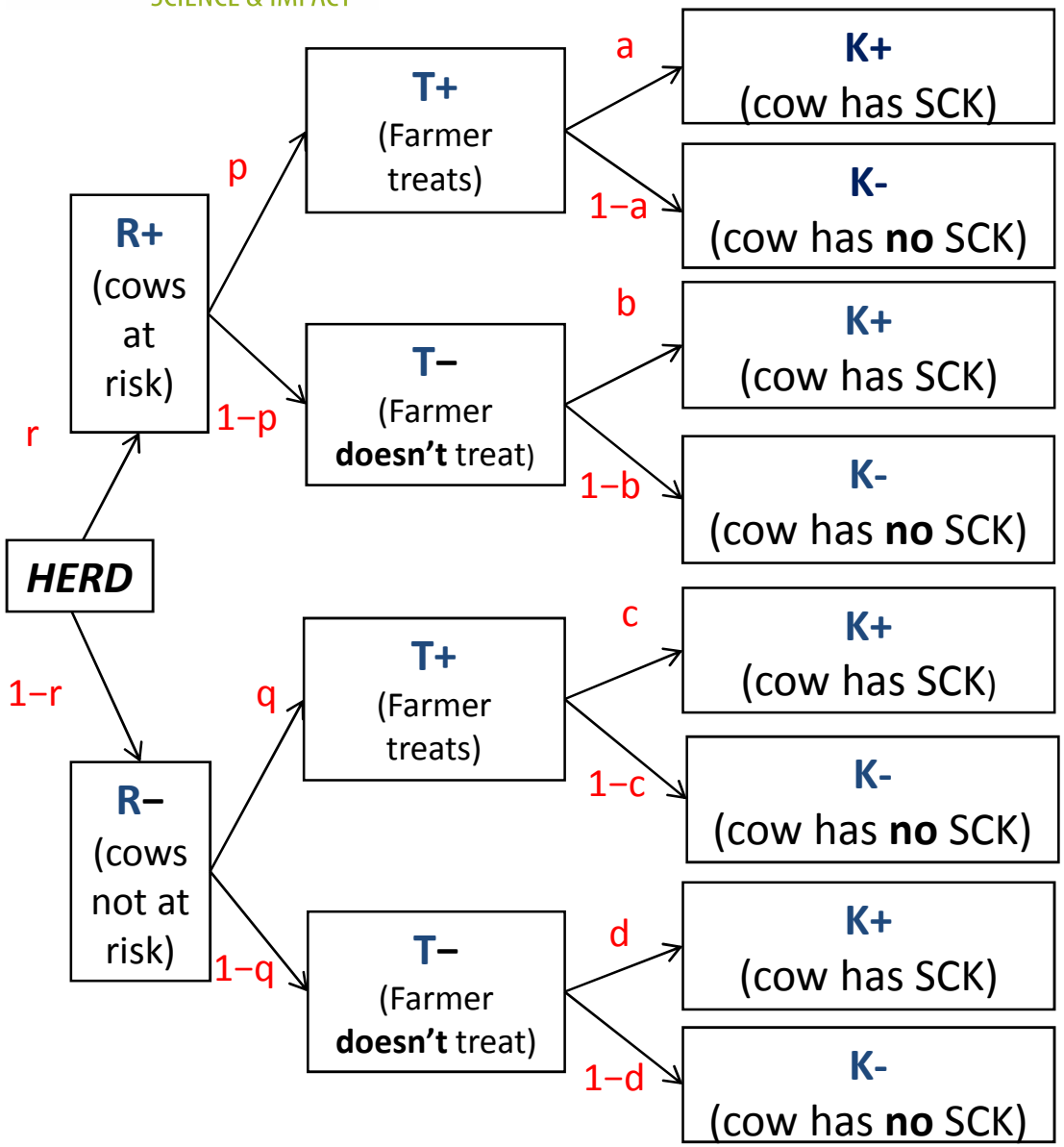
Subclinical ketosis (SCK)

- SCK is expected to increase curative antibiotic use
  - Because SCK promotes infectious diseases that are treated among other with antibiotics (some of them being critical)

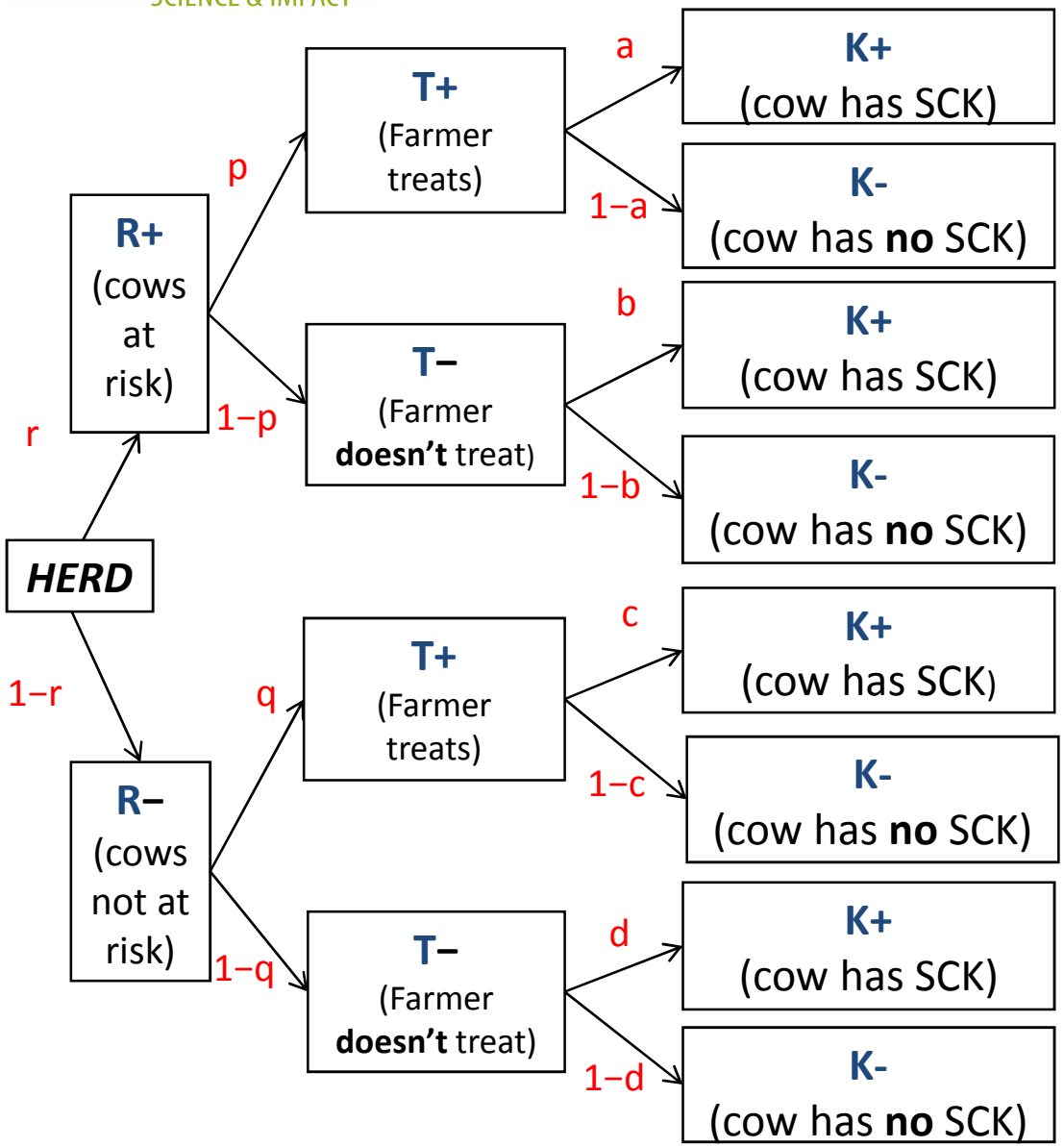
- Control of SCK is based on
  - Herd and diet management prepartum and early postpartum
  - Use of Kexxtone® (monensin) for cows at risk for SCK

- Objective
  - To quantify the decrease in curative antibiotic use allowed by the decrease in SCK prevalence, using or not Kexxtone®

Methods (step 1)



Methods (step 2)



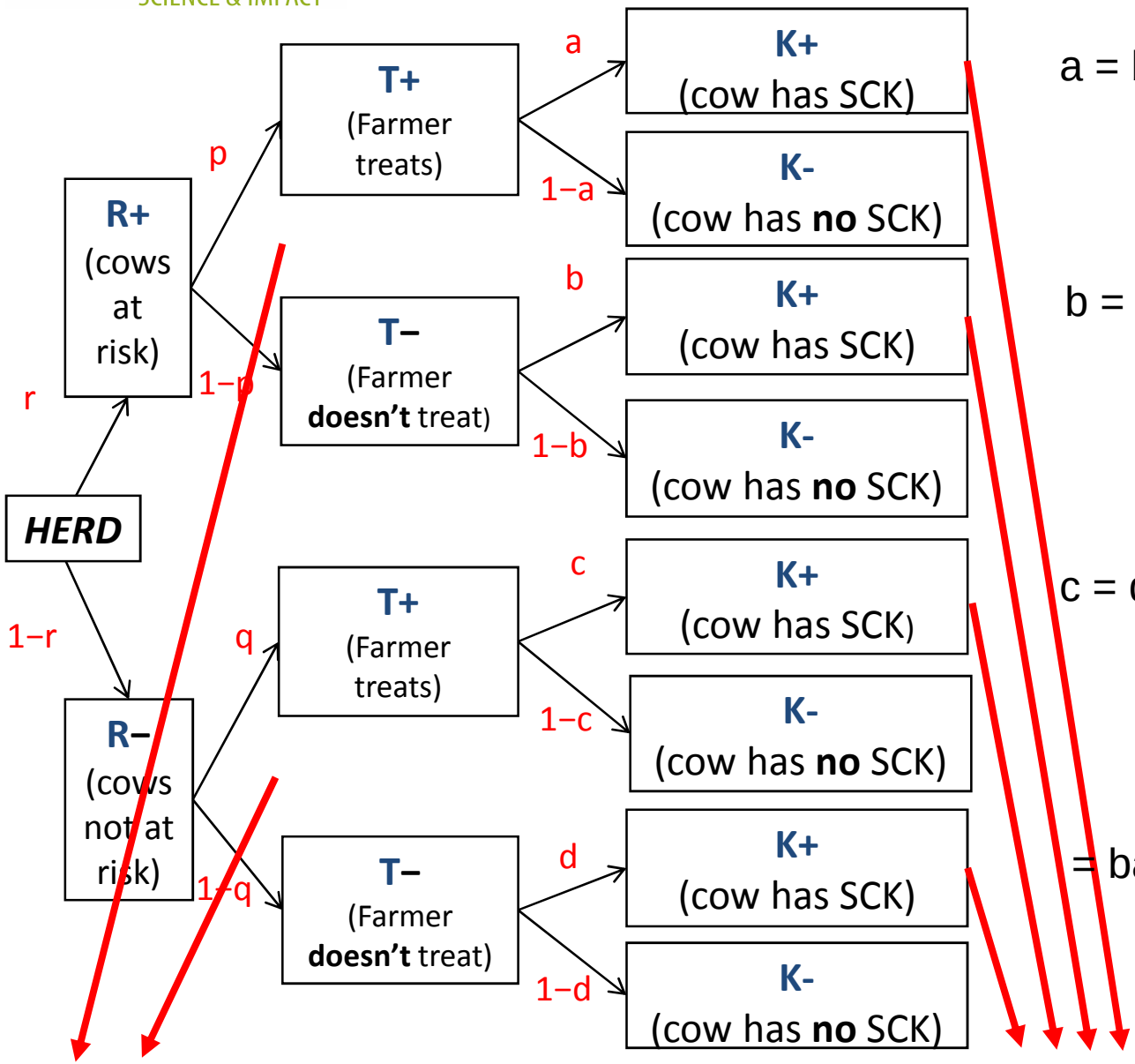
$a = b * (1- Efficacy_{Kexxtone})$

$b = d * OR_{SCK\_if\_At\ Risk\ for\ SCK}$

$c = d$ *(Kexxtone® not efficacy on cows not at risk for SCK)*

= basic « natural » risk of SCK

Methods (step 2)



$a = b * (1- Efficacy_{Kexxtone})$

$b = d * OR_{SCK\_if\_At\ Risk\ for\ SCK}$

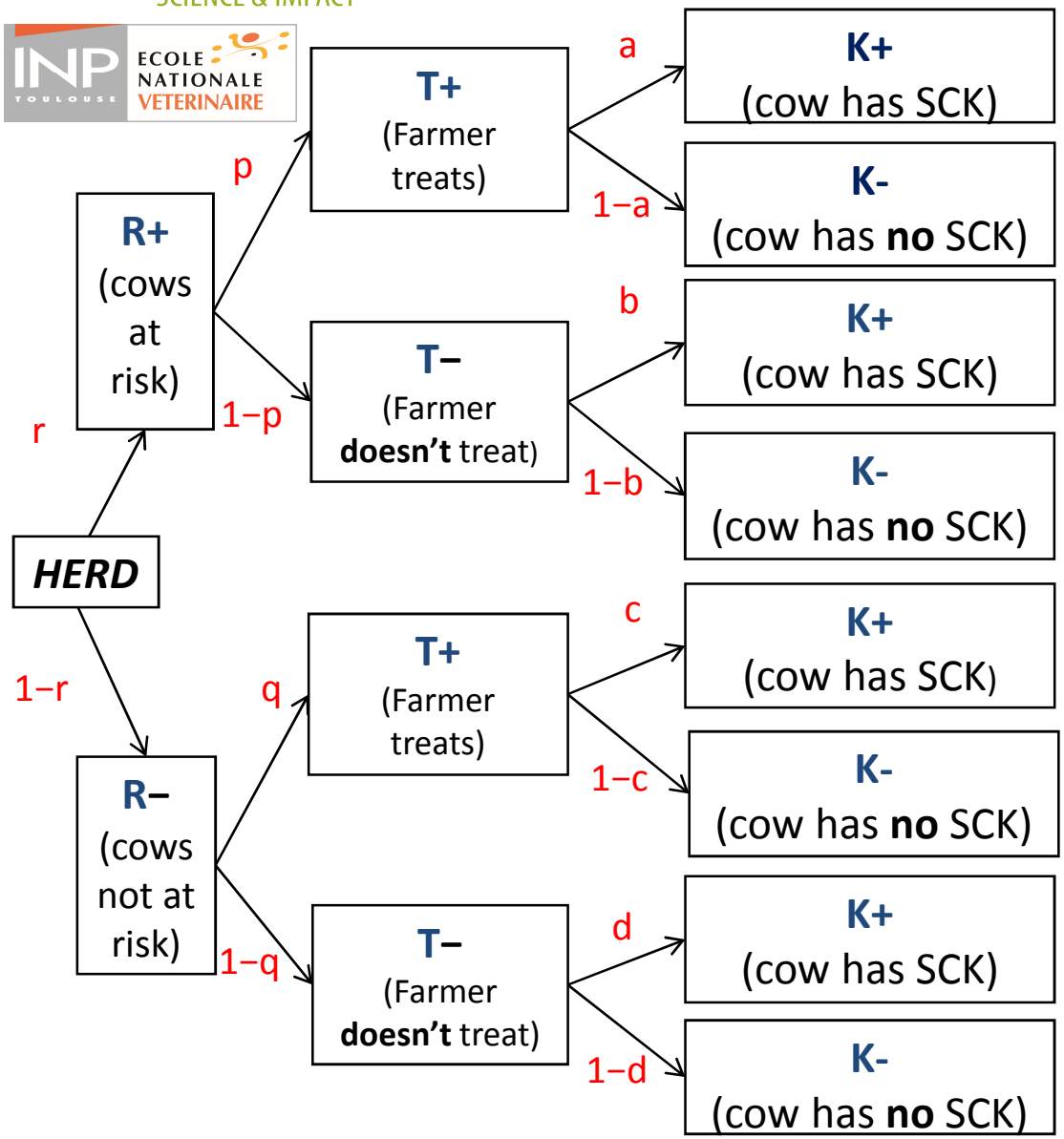
$c = d$ *(Kexxtone has no efficacy on cows not at risk for SCK)*

= basic « natural » risk of SCK

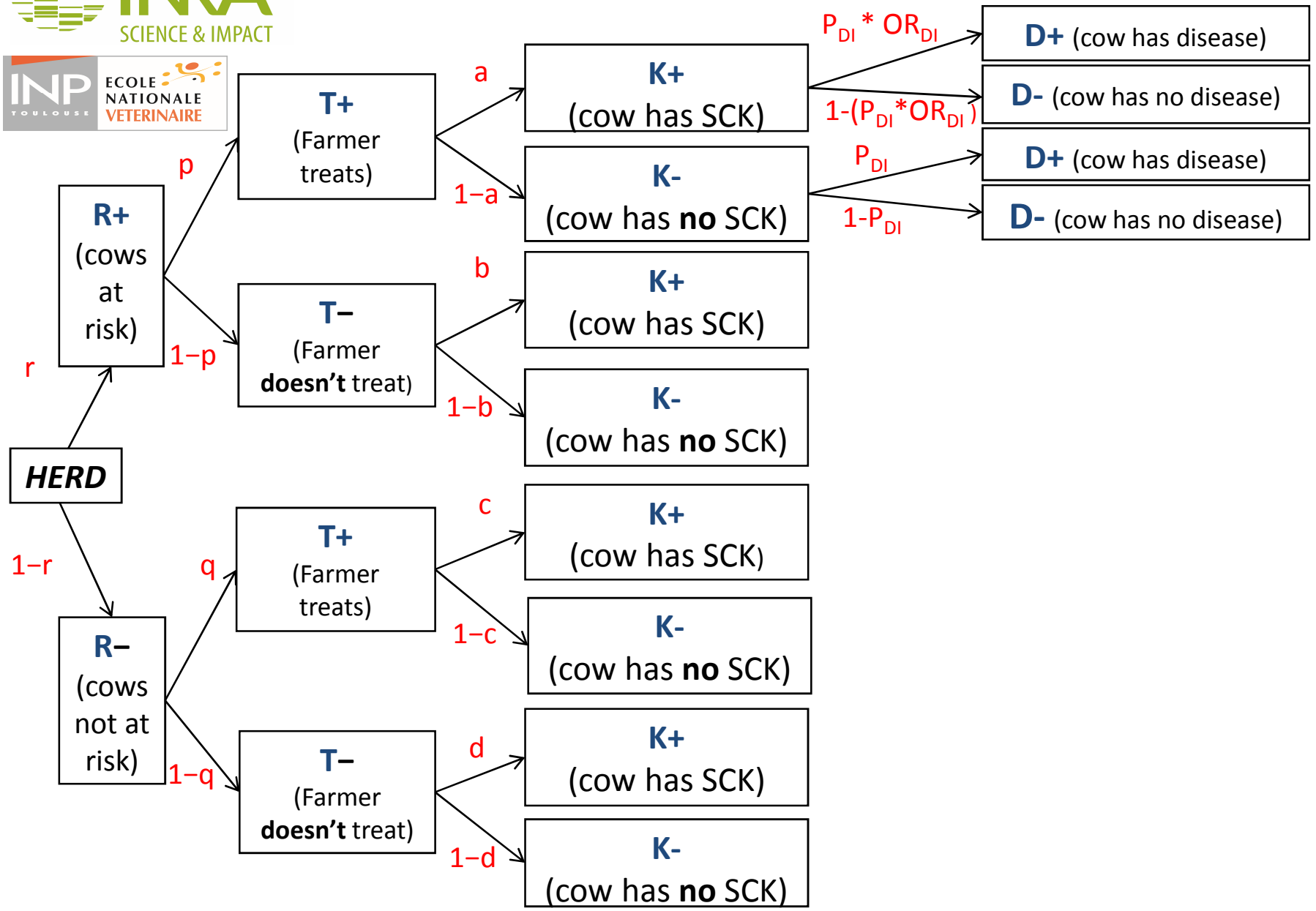
Targeting index= rp + (1-r) * (1-q)

Prevalence = rpa + r(1−p)b + (1−r)qc + (1−r)(1−q)d

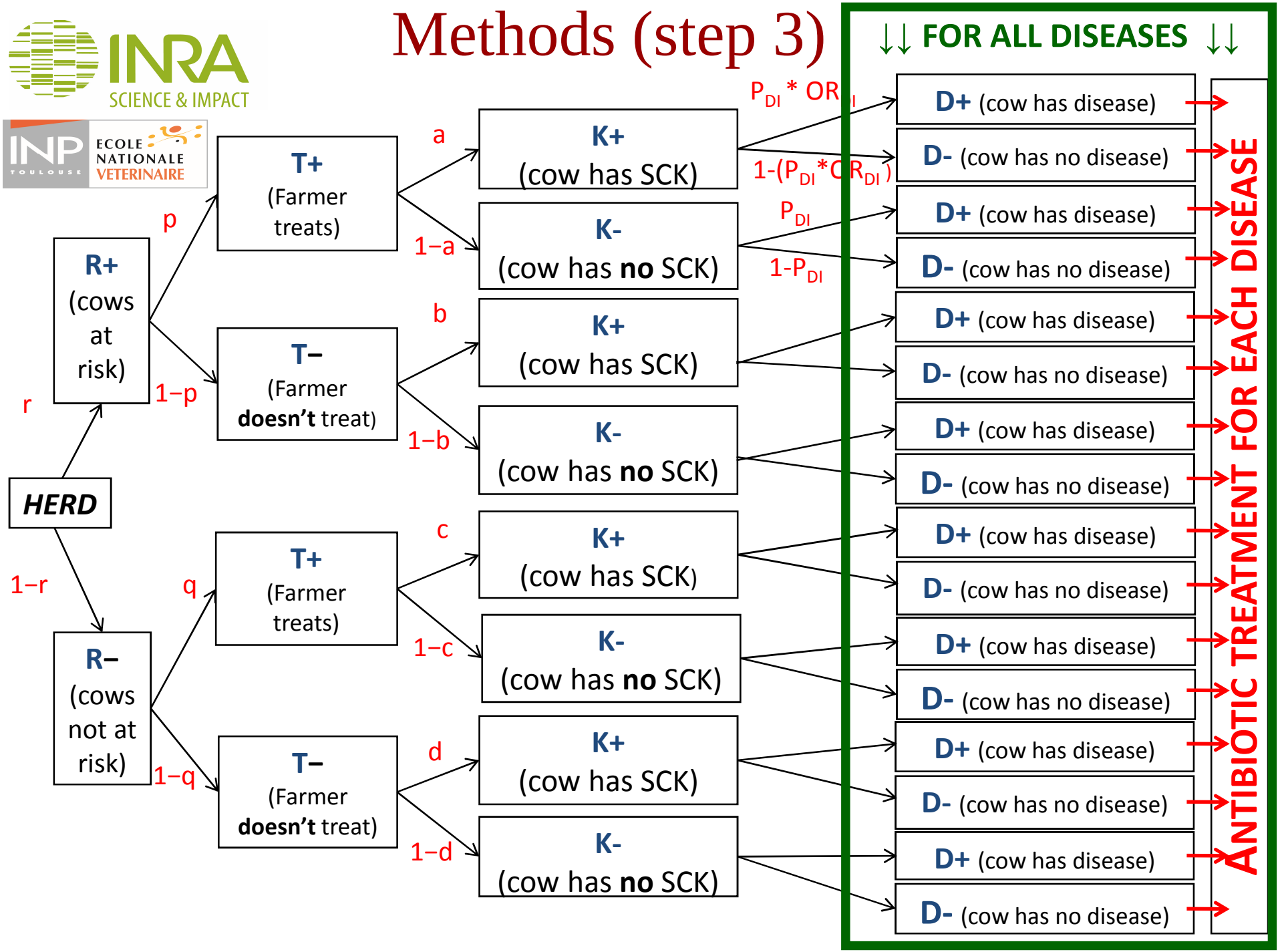
Methods (step 3)



Methods (step 3)



Methods (step 3)



Methods

- Calibration
  - OR_{DI}
  - P_{DI}
  - Others

J. Dairy Sci. 97:7547–7563
http://dx.doi.org/10.3168/jds.2014-8237

Diseases, reproductive performance, and changes in milk production associated with subclinical ketosis in dairy cows: A meta-analysis and review

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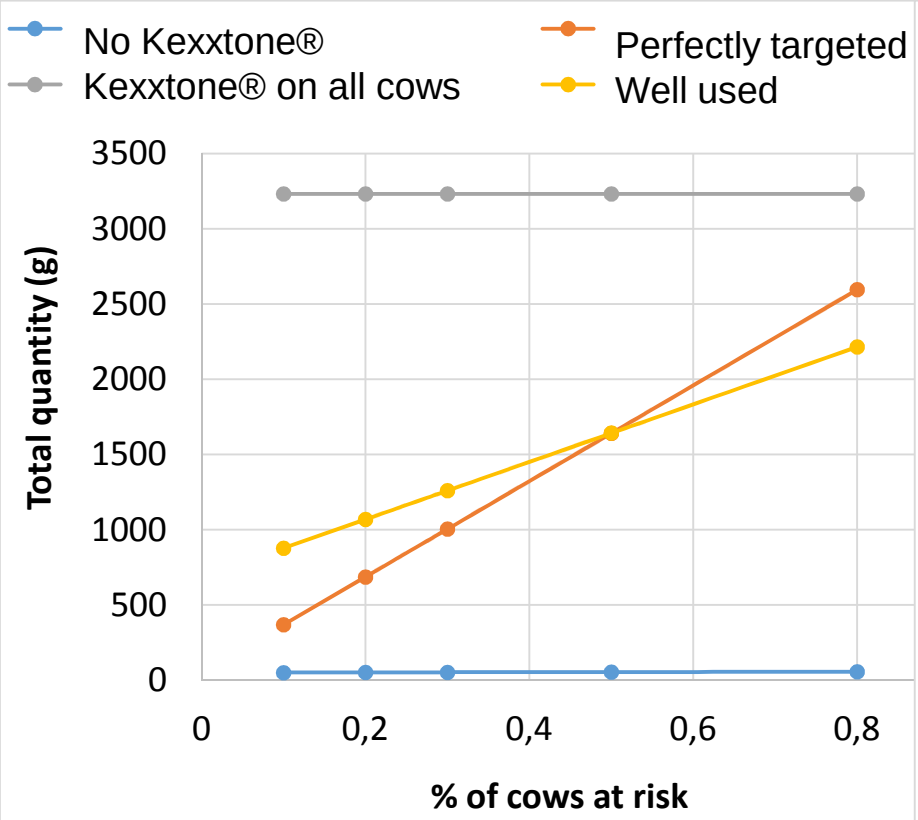
	Scenario 1C	Scenario 2C	Scenario 1A	Scenario 2A
$OR_{SCK\_if\_At\ Risk\ for\ SCK}$	2.13	4.5	2.13	4.5
Antibiotic	Céphalosporines		Pénicillines A	
$Efficacy_{Kexxtone}$	0.66	0.66	0.66	0.66
Basic « natural » risk of SCK (value of d)	0.15	0.15	0.15	0.15
% of ill cows treated with curatif antibiotics	From 0% to 100%, depending on illness			

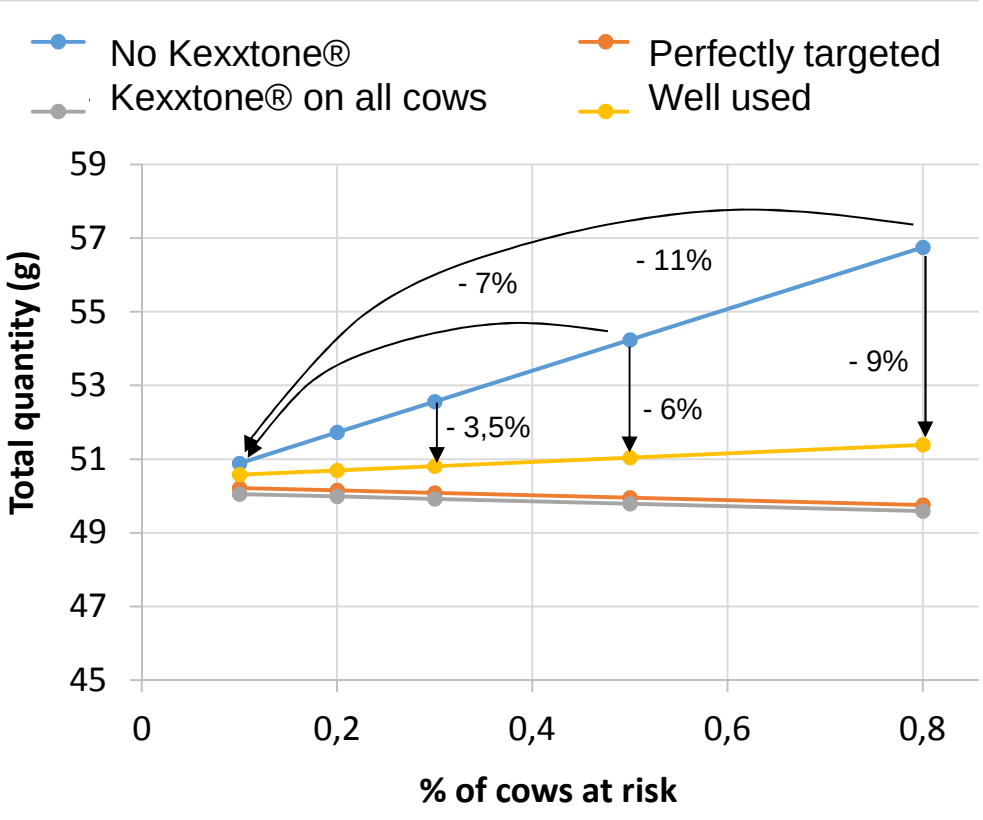
Results

- Exposition (cephalosporin, $OR_{SCK\_if\_At\ Risk\ for\ SCK}$ = 2,1)

Cephalosporin + Kextonne®



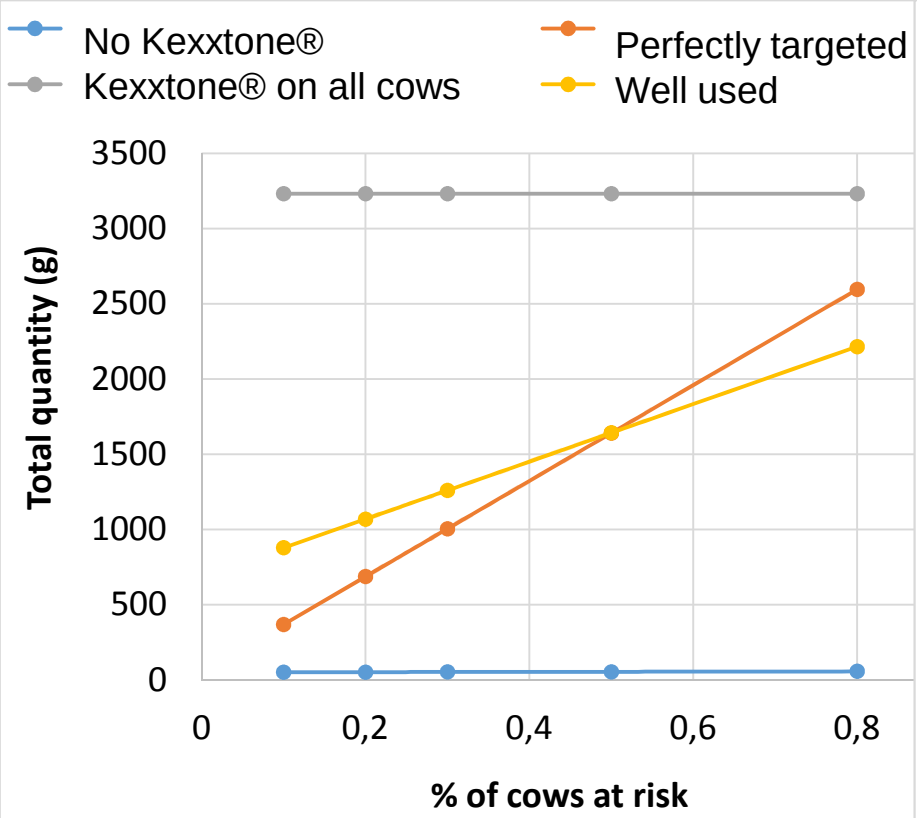
Cephalosporin only



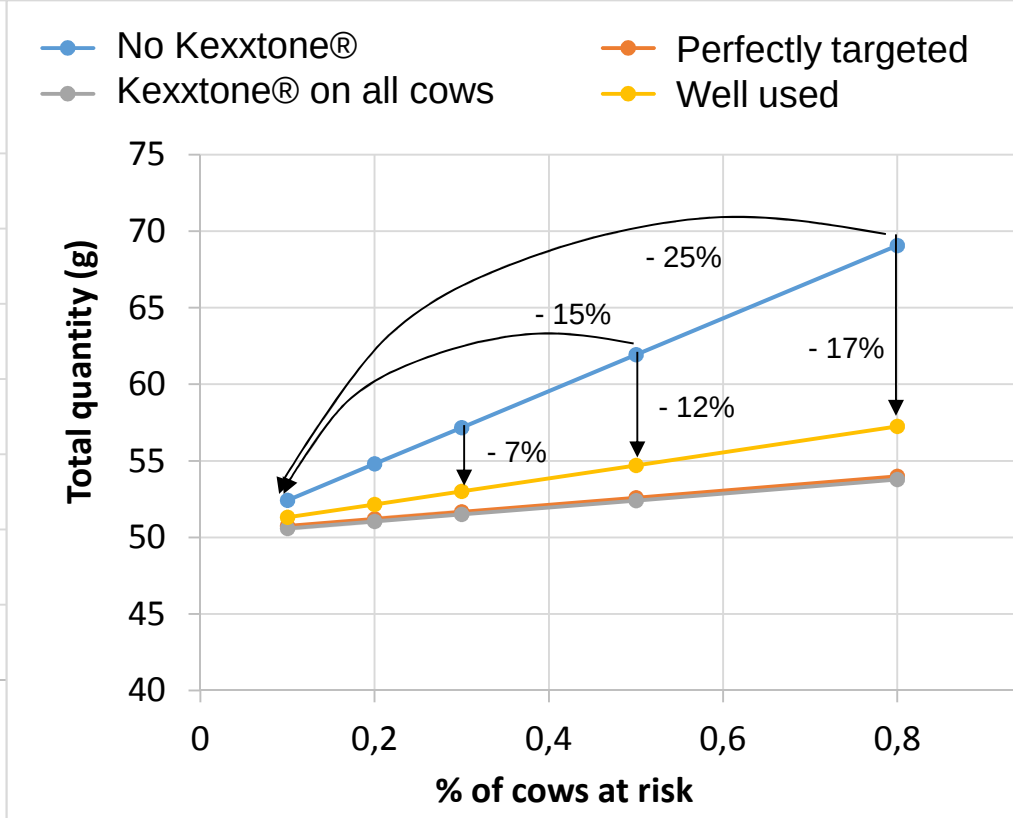
Results

- Exposition (cephalosporin, $OR_{SCK\_if\_At\ Risk\ for\ SCK}$ = 4,5)

Cephalosporin + Kextonne®



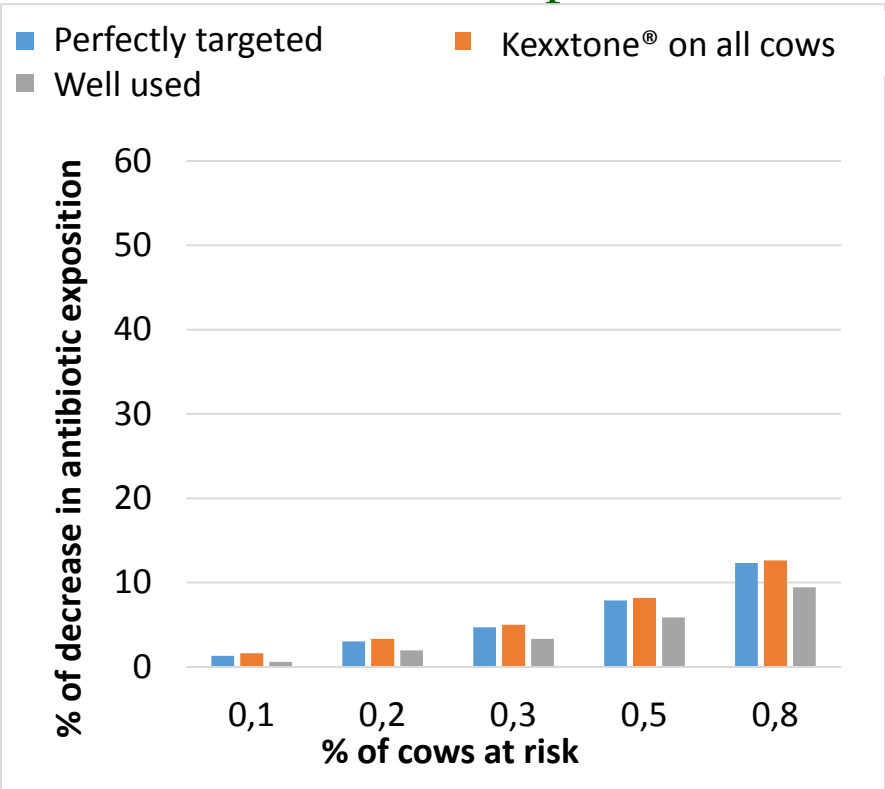
Cephalosporin only



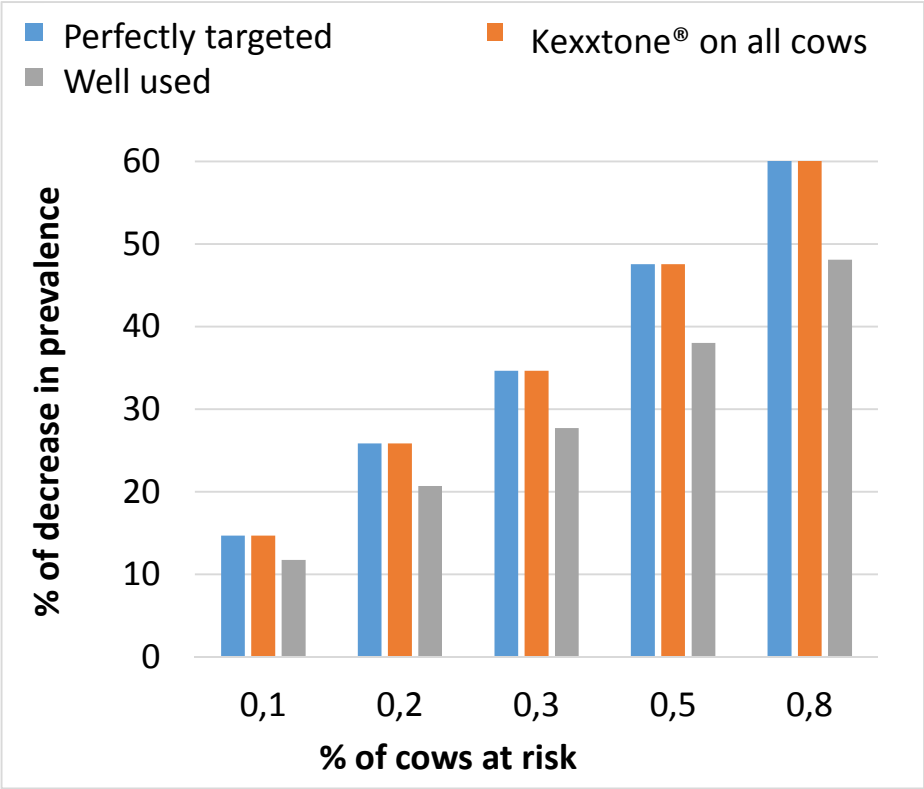
Results

- Exposition (cephalosporin, $OR_{SCK\_if\_At\ Risk\ for\ SCK}$ = 2,1)

Decrease in exposition



Decrease in SCK prevalence



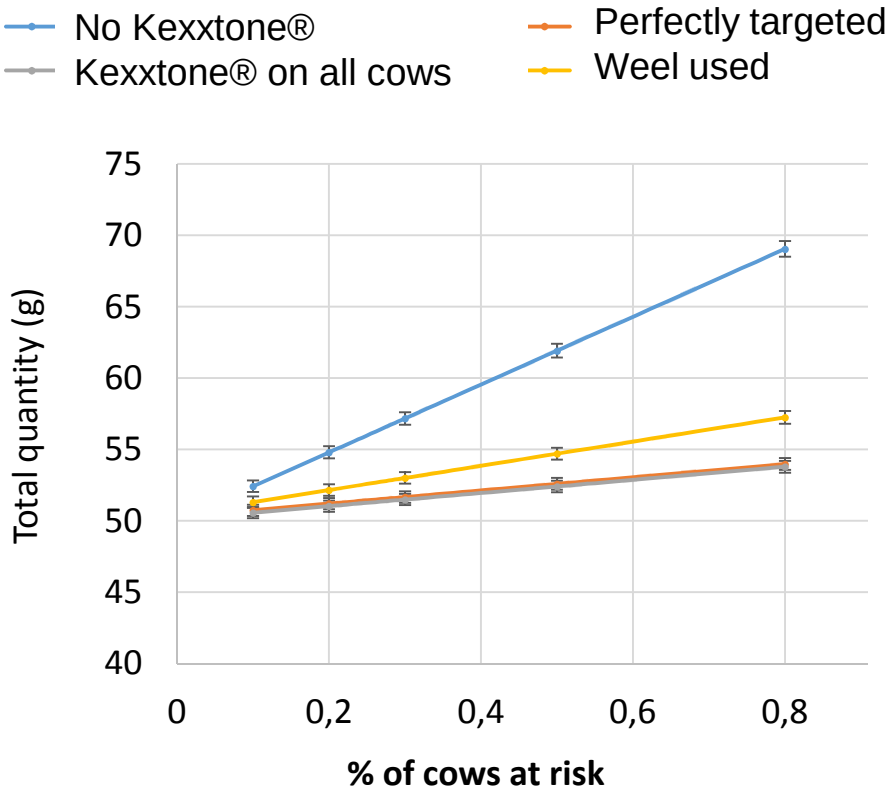
The decrease in exposition is dramatically lower compared to the decrease in prevalence

Because cows without SCK have a minimal level of risk of diseases and antibiotic treatments

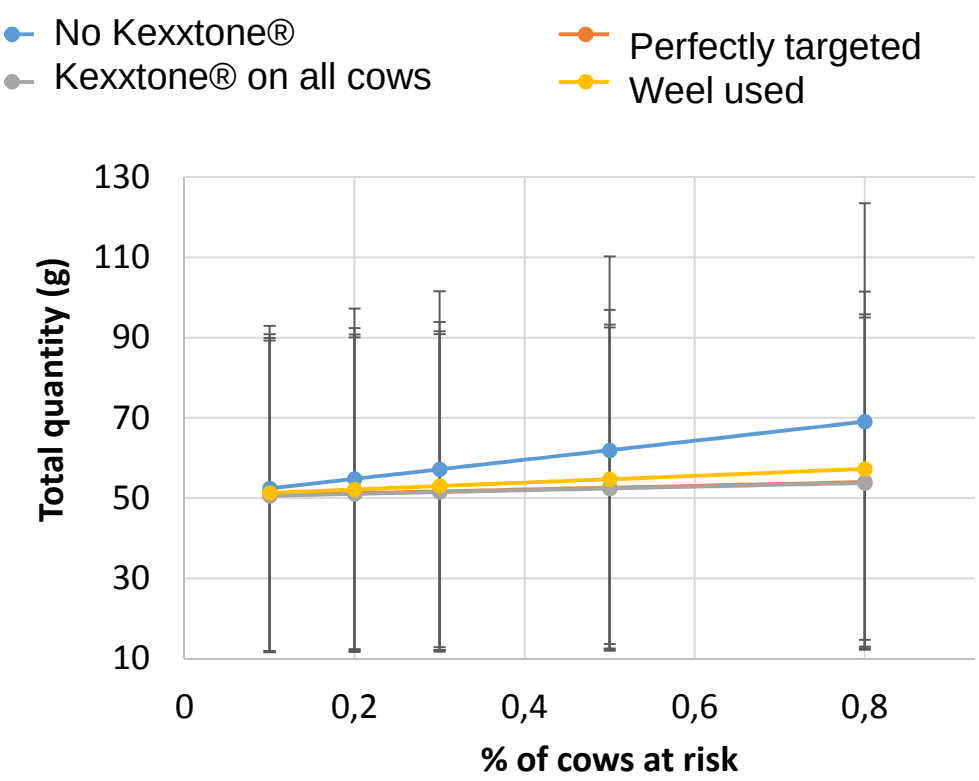
Confidence and prediction

- Exposition (cephalosporin, $OR_{SCK\_if\_At\ Risk\ for\ SCK}$ = 2,1)

95 % confidence interval



95% prediction interval



Results are robust for a large population, but no prediction at the farm level

Bring home message

- **Without using Kexxtone ®,**

  decrease of % of cows at risk

  → a decrease in prevalence of SCK from 68% to 17%

  → an 25 % average decrease in curative antibiotic used

- **Use of Kexxtone®**

  allows to keep the use of curative antibiotic at low levels (few SCK)

- Compared to lack of treatment, use of Kexxtone® allows a decrease up to 25% of curative antibiotics (30-35% in extreme cases) for herds / cows at risk

- No prediction at cow/herd level (variability), but results are robust for large populations

- Other situations and scenarios not shown here (sensitivity analysis)

Acknowledgement and conflict of interests

Thanks to

Michael Mounié

Elodie Khenifar

Clélia Cahuzac

Elise Maigné

A preliminary work used as support of the present study has been funded by the INRA program “Sustainable Management of Animal Health” Ruminflame

The present work was funded by Elanco France.