Bioeconomic modelling for onfarm antimicrobial use reduction in french dairy farms

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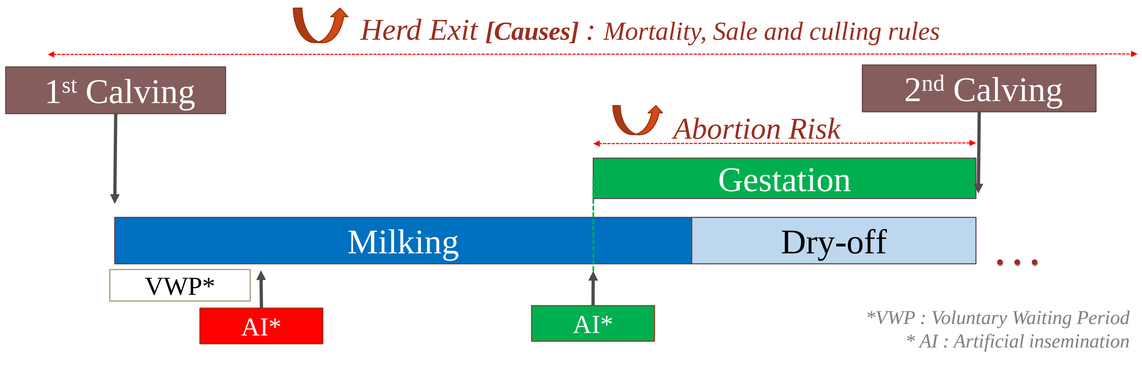
Introduction

What are the trade-offs between AMU and farm income in dairy production ?

Bio-economic model implementation and scenario formulation

Scenarios simulation (Biological model)

Biological model : Stochastic, dynamic and recursive monte carlo « cow week » simulator



Optimisation under constraints (economic model)

Input and output prices volatility — Forage quality variability

Objective function: **Maximize** $U = INCOME - RISK\ Aversion$

UNDER CONSTRAINTS (UC)
Technical, Labor, Budget et AM Exposure

Scenarios formulation

Odds Ratios for clinical mastitis infections are applied for each strategy

- **T1** — **#Common** : Systematic AM treatment
- **T2** — **#Alternative 1** : Selective AM treatment : cows at risk
- **T3** — **#Alternative 2** : Selective AM treatment and teat sealer

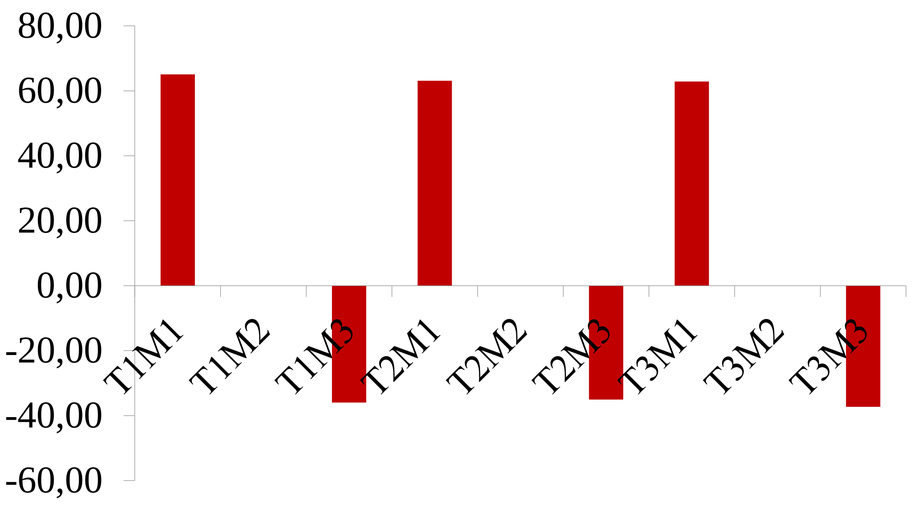
9 scenarios = 3 technical strategies(T) **X** 3 Farm/Health management strategies (M)

- **M1** — # "Good" management
- **M2** — #"Usual" management
- **M3** — # "Deteriorated" management

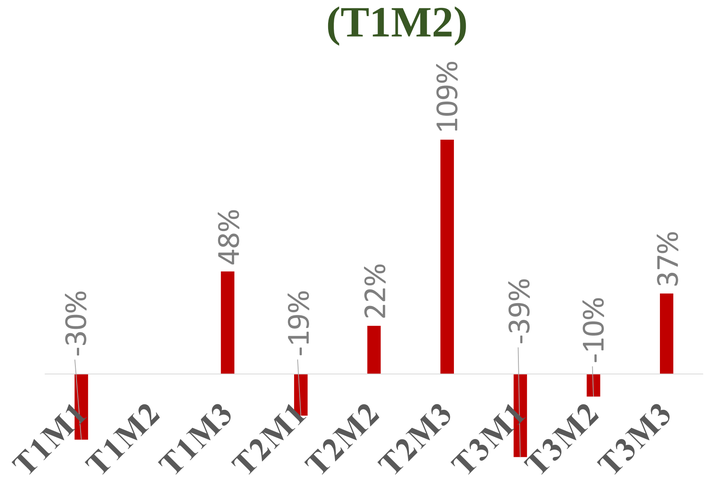
Each strategy implies OR for clinical mastitis and Subclinical Ketosis and extra cost and extra workload for farmers

Results

Additional workload (hours/month)



ALEA Compared to the baseline scenario (T1M2)



❖ *Optimal strategy ?*

Maximize the breeder's income → **T1M1**

Maximize the breeder's income → **T3M1**
U/C — AMU reduction

Maximize the breeder's income → **T3M2**
S/C — AMU reduction
\+ Limited workload

Discussion

Selective dry-off strategies are effective to lower AMU while maintaining famer's income at a satisfactory level , in some situations with *good health practices*. But, those scenarios appears to be the *most time-consuming*,

Integrated bio-economic modeling allows :

- A holistic representation of herd : modeling events and their dependencies, limiting a priori on the biological functions
- Explicit formulation of constraints that farmers face and considering risk aversion to better represent farmers decision process