59th annual meeting of EAAP
Vilnius, August 24th-27th 2008
S13: Assessment of Sustainability in Livestock Farming Systems

Assessing impacts of weather events on French suckler cow farms:
a dynamic recursive farm model

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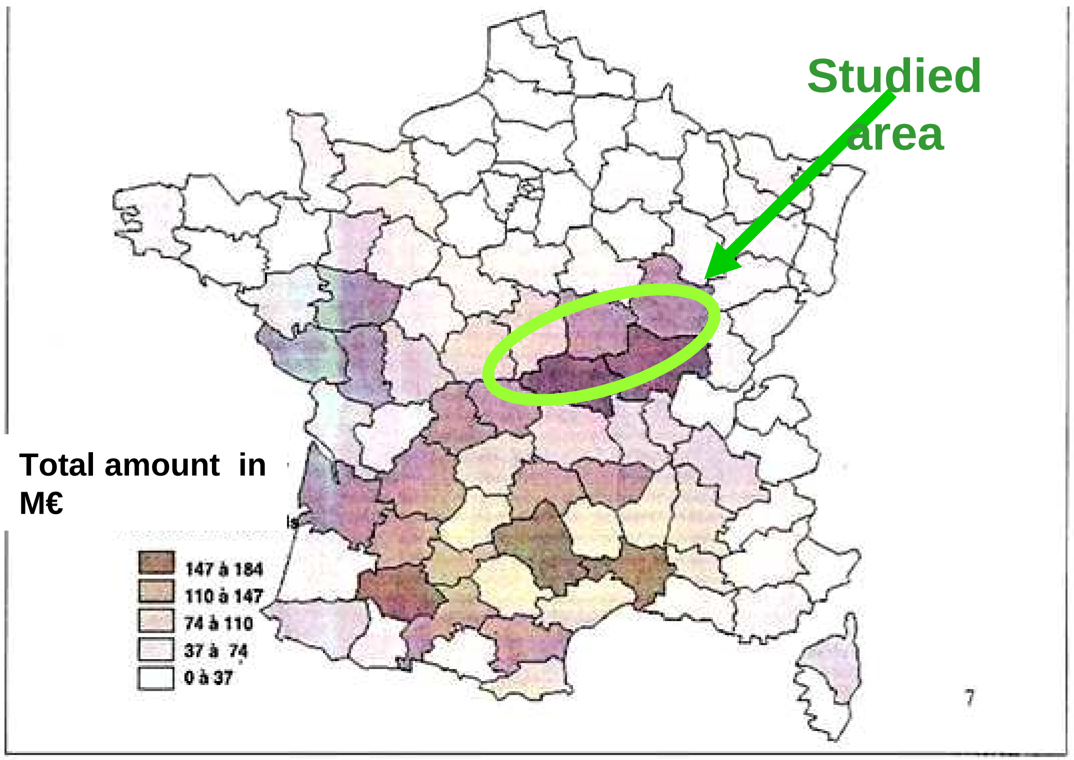
1. Introduction

- Sustainability: farms have to maintain in spite of disturbances

- French suckler cow farms: sensitive to weather variation

Compensation for weather calamity by the French National Public Fund per administrative region from 1980 to 2005



Source: Boyer, 2006

1. Introduction

→How crop yield shocks impact on farm outcomes?

Objectives are :

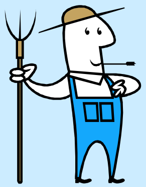
1) to predict the optimal mix of production adjustments : control of animal live weight /animal number/feed stock,

2) to quantify how far the system moves from the equilibrium and how long it takes to return

3) to measure impact of shocks on economic results

2. Model overview

•A dynamic bio-economic model representing the monthly management of a beef cattle farm



FARMERS DECISIONS

Monthly decisions **:** animal sales, animal diet energy content and composition, feed produce purchased and sold, percentage of grass cut

Annual decisions **:** animal fattening and reproduction, crop production areas

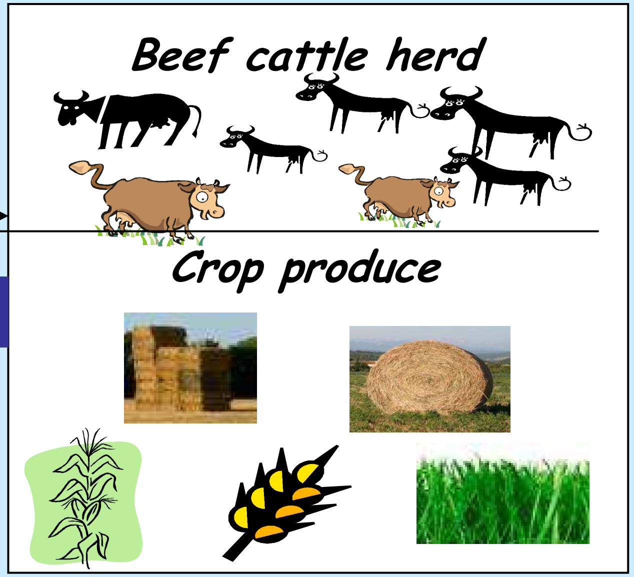
{D (t) }

-Head number

-Average liveweight

{V(t)}

-Stock quantity



-Head number

-Average liveweight

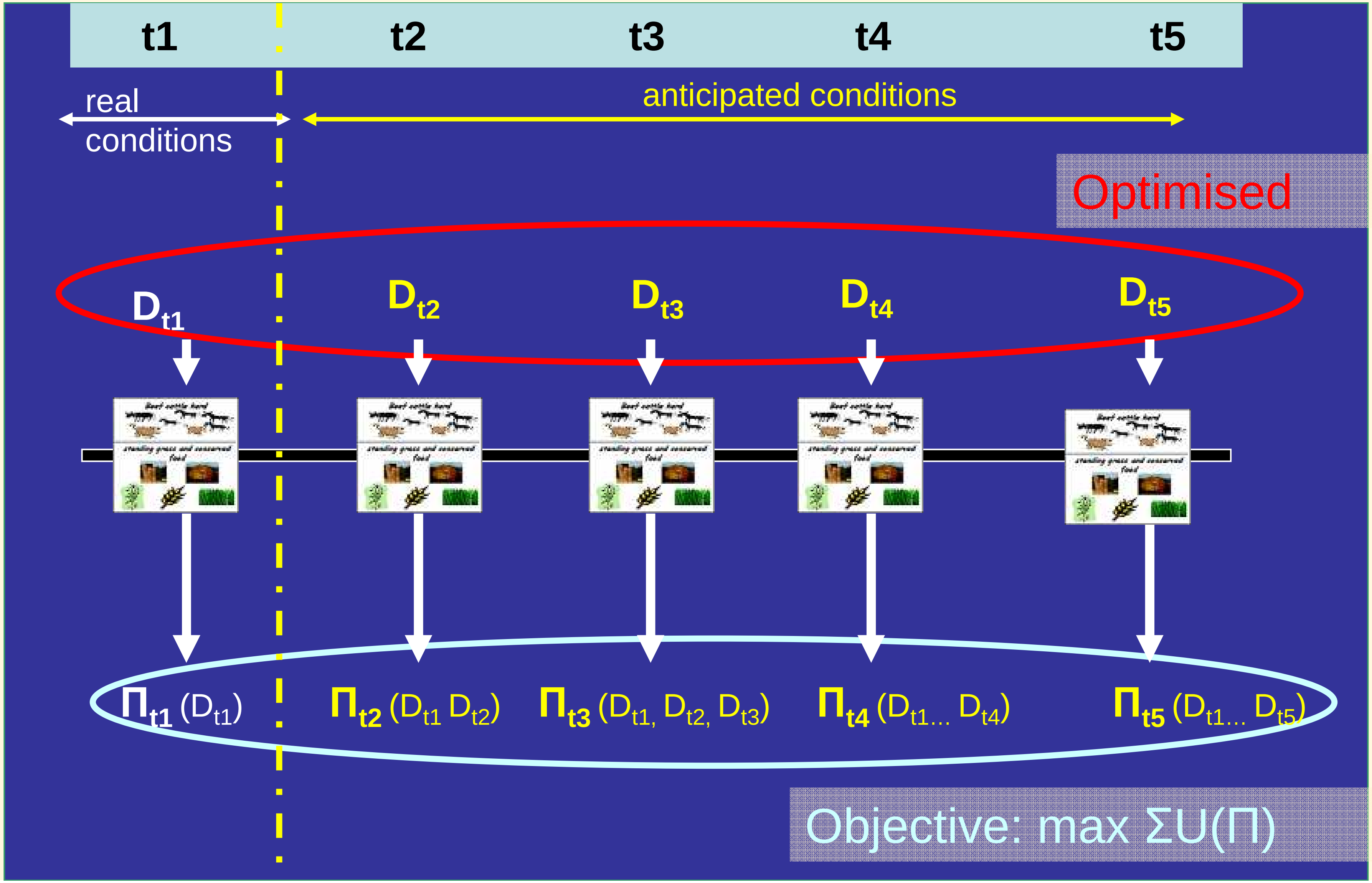
{V(t+1)}

-Stock quantity

PRODUCTION SYSTEM

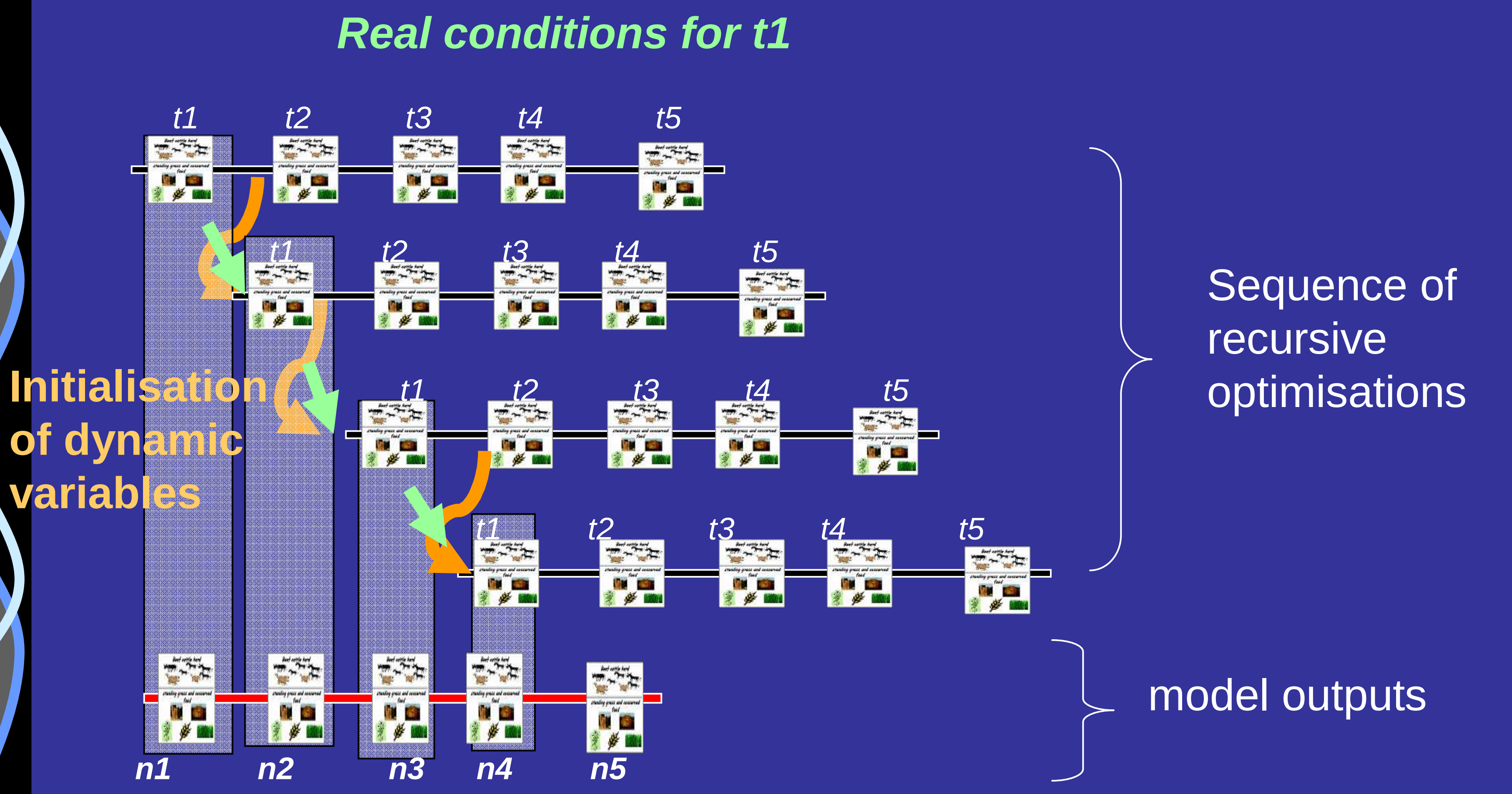
2. Model overview

•Decisions optimised over a 5 year planning horizon



2. Model overview

•A recursive framework to introduce unexpected change



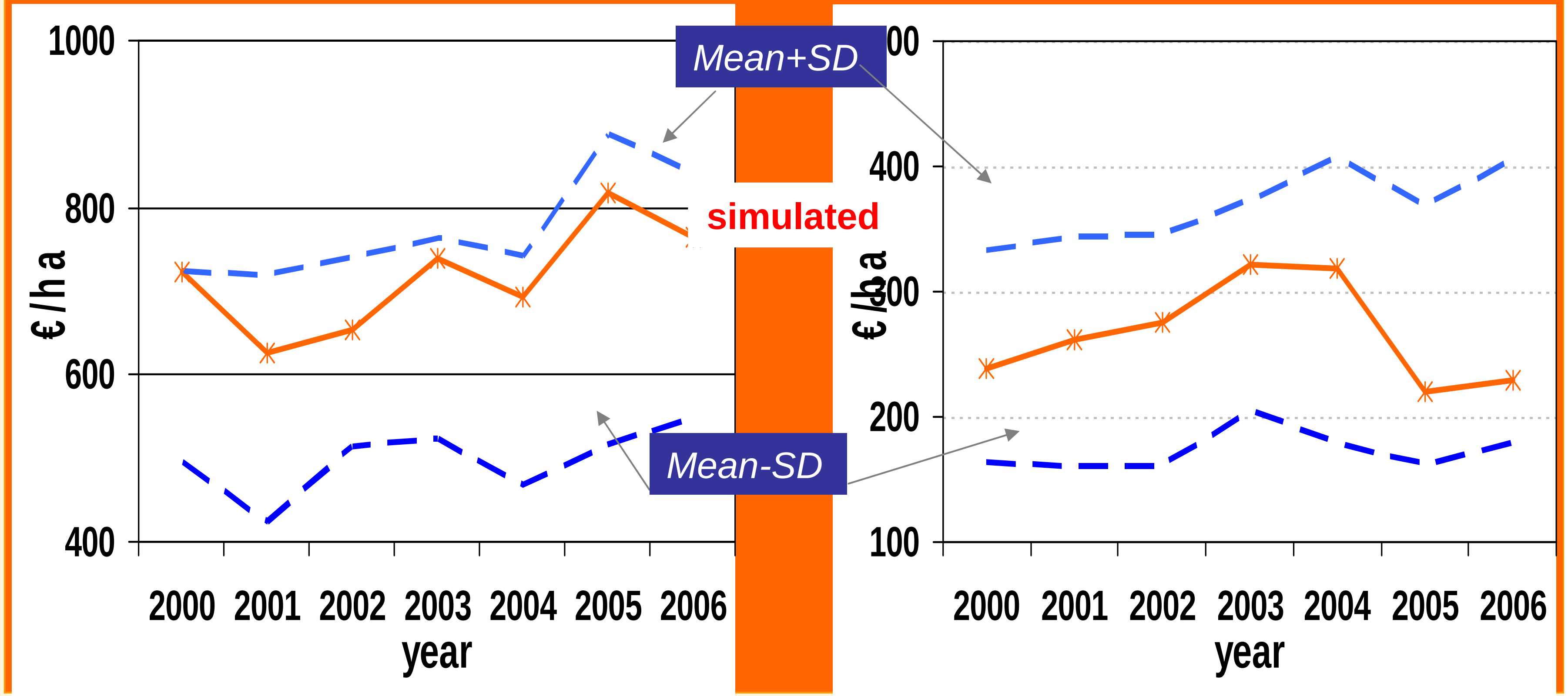
3. Model parameterization and evaluation

- Structural characteristics= average of 25 farms producing Charolais in the north of Massif Central *(150 ha, max 95 calvings)*

- Evaluation of model outputs against a panel data

Receipt from animal (€/ha)

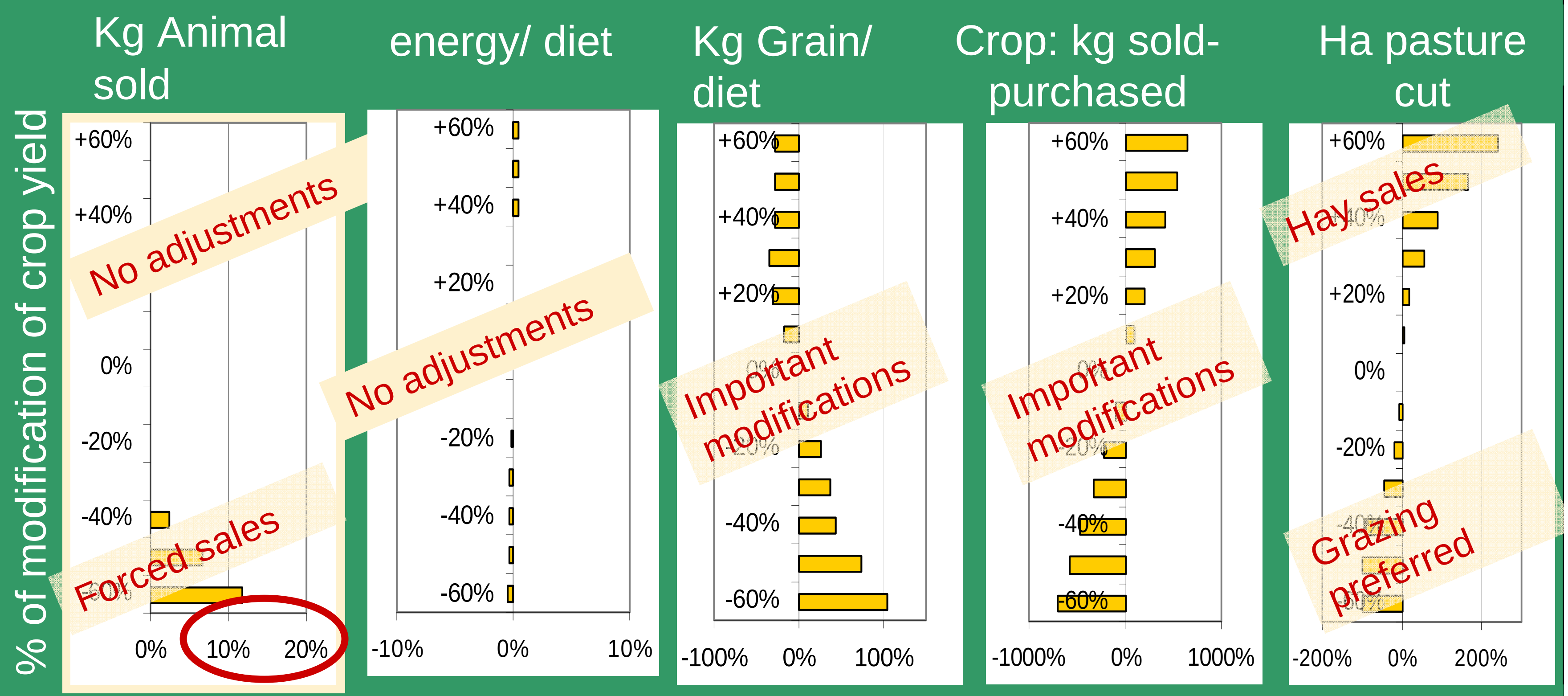
Variable cost - crop receipt (€/ha)



4. Application

•Modifications of crop yield ranging from -60% to +60% of their average values are introduced into the simulated time span, i.e. the year referred to as *“n3”* between ‘average crop yield’ years.

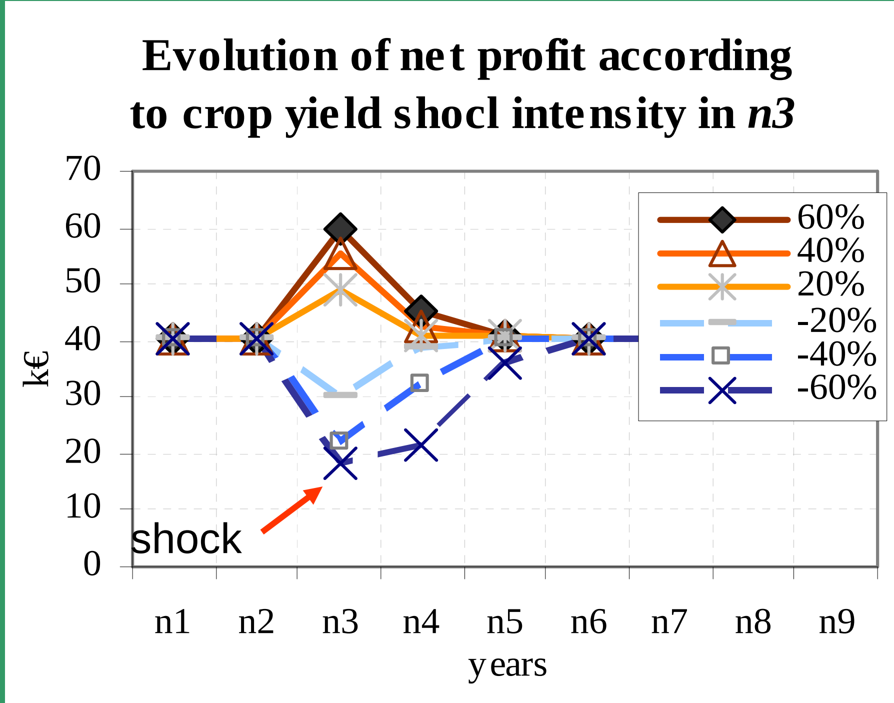
•Evolution of production decisions between equilibrium and year *n3* :

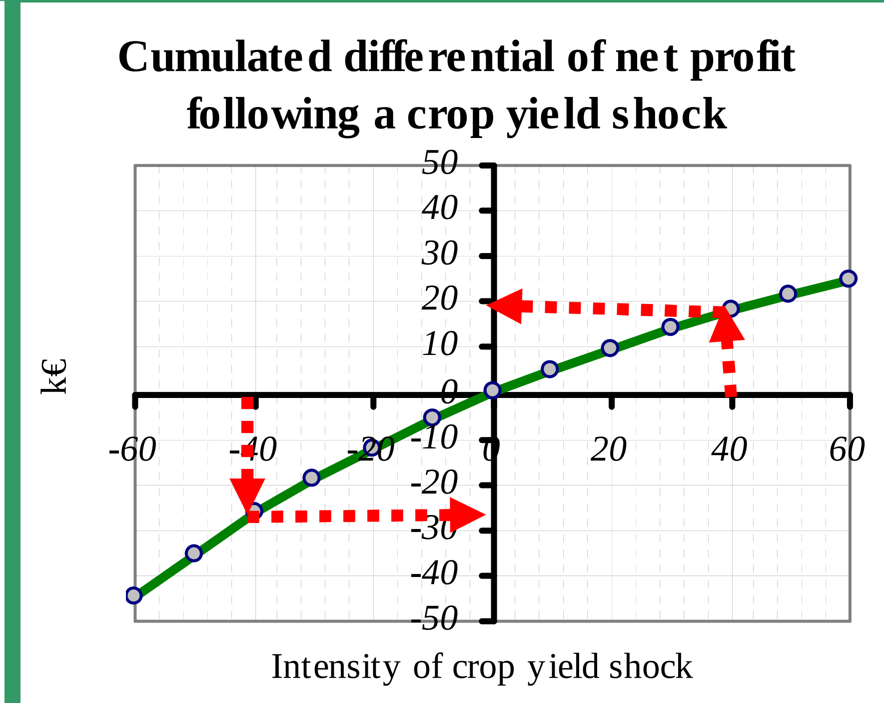


% of variation of production management indicators between year of shock occurrence (n3) and equilibrium level

4. Simulation of crop yield shocks

•The more important the shock, the greater impacts are in year *n3* and the longer the time to recover is





• Profit surplus for good years can not compensate totally profit losses for symmetric negative shocks

Conclusion

✓**Predictions are closed to reality**

✓**Optimal mix of production adjustments varies according to shocks intensity.**

✓**Several years are sometimes necessary to recover from a crop yield shock**

✓**Additional profit in good years do not totally compensate those of bad years**

✓**But these results are conditional to relative prices, CAP etc.**

Perpectives to improve assessment of farm capacity to maintain in spite of disturbance

✓**Introducing risk anticipation**

✓**Simulating combinations and successions of different shocks over a span time**

✓**Adding minimum cash needs for the household, loans possibilities and cash saving**

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Thank you for your attention!

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