# Abolition of the EU milk quotas and dairy farmers' productive strategies

Baptiste Lelyon, Vincent Chatellier, Karine Daniel

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## *Implication for the dairy farmers' in the West of France?*

**Baptiste LELYON[(1)] - Vincent CHATELLIER[(2)] - Karine DANIEL[(2,3)]**

**(1) Institut de l'Elevage, GEB, Paris (France)**
**(2) INRA, UR 1134, LERECO, Nantes (France)**
**(3) ESA, LARESS, Angers (France)**

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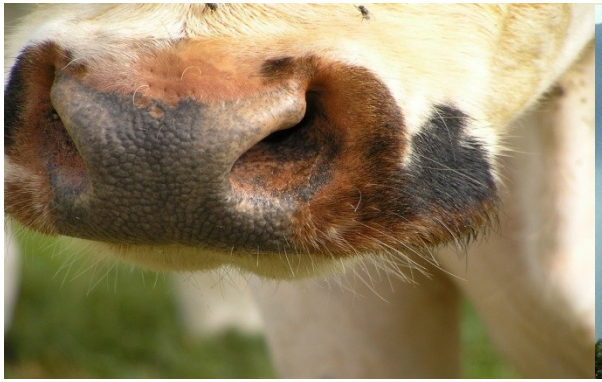
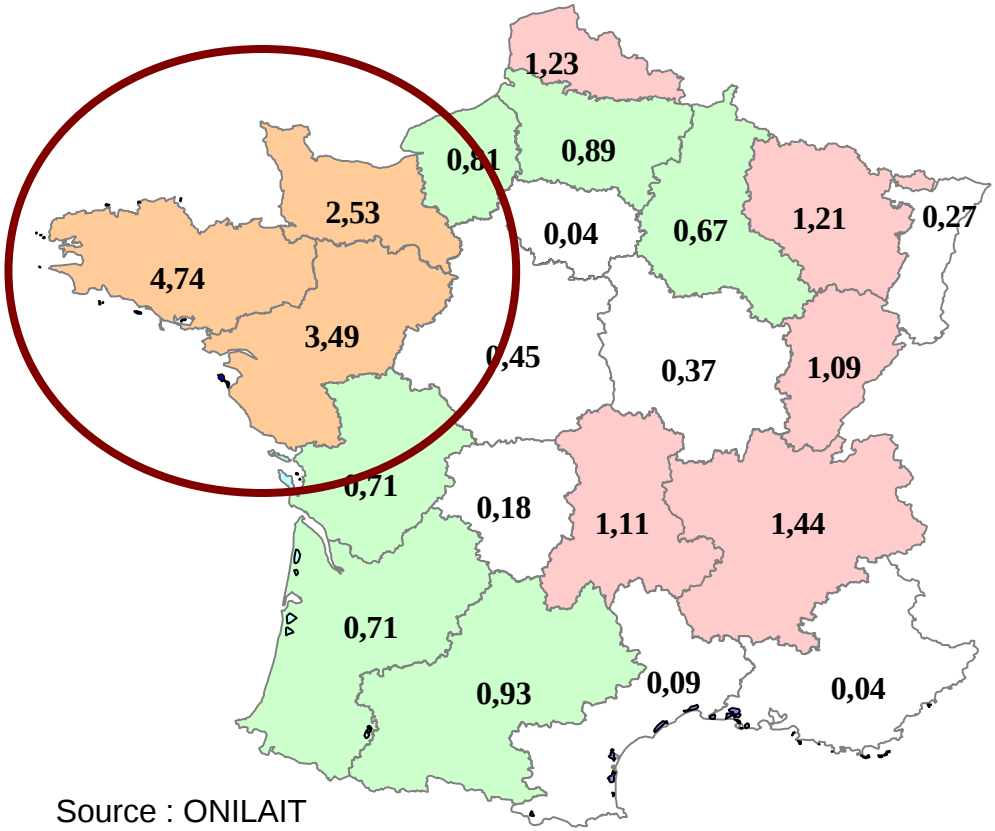


# BIG-BANG in the dairy world

- **Towards the end of the milk quota (2015)**
  - 1984-2008 : milk supply control = stable income
  - Why ?…economical inefficiency (Colman, 2000)
- **The strong prices variation**
  - For milk…but also for cereals and inputs
- **Milk strike in France and Belgium**
  - Two weeks of demonstrations
- **Solution : contract between producers and dairy processors**

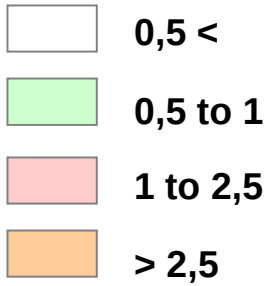
# The west regions : 45% of the French dairy production




Source : ONILAIT

## ➢ The dairy farms (in western regions)

- 40 000 dairy farms
- A low productivity
  (150 000 kg of milk per Annual Work Unit)
- A diversity of technical systems
  (with a large importance for maize)



# A model to reach two objectives

❶ **Better understand and anticipate the implications of the Health Check on the dairy farmer supply behaviour…**
**with taking price variations into account**

❷ **Evaluate the impact of a scenarios of removal of milk quota : Contractualisation "double volume – double price"**

➢ **A linear programming model**

- **Maximise the income**
- **Represent the complexity of the production system**
- **Consider at the same time production, price and policy information**

# 2- The model

# A Model to represent a “realistic” dairy operation

- **The feeding system and the forage production are linked**
  - Rations are determined by nutritional requirement (Groen, 1988; Shalloo et al, 2004)
  - Surfaces (ha) and production quantity (kg) are dissociated

- **The milk yield/cow is not constant** (Peyraud, Faverdin, 2009)
  - The farmer can produce in a range of 1000 litters below the cow genetic potential (1 liter of milk = 0.44 energy unit and 48 protein units)
  - Above the genetic potential, the milk yield is decreasing (1 liter of milk = 1.4 energy unit and 120 protein units)

- **The crop yield depend on the nitrogen used** (Godard et al, 2008)
  - …but the relation between nitrogen and yield is not linear
  - Several sources of nitrogen are considered : manure, slurry, chemical

# A Model to represent a “realistic” dairy operation

- **4 periods are taken into account**
  - The seasonal specification of grass production (yield and composition, Berentsen et al, 2002)
  - The allocation of the Working force

- **The model integrates the risk aversion to price variations**
  - The Utility Efficient Programming (UEP) method maximise the expected utility of the income…with a minimisation of its variability (Hardaker et al, 2004)

# The model optimise the following variables…

- **Number of each type of animal**
  - Dairy cows, calves, heifers and young bulls
- **Milk yield per cow**
- **Feed composition (forages et concentrates)**
  - Pasture, grass silage, hay, maize silage
  - Wheat, Soya, rapeseed, production concentrate, milk or milk powder for the calves
- **Crop rotation and nitrogen quantity**
  - Grassland, maize, wheat, pea and rapeseed
- **Cereal production sold or home consumed**

# The model is applied for four types of farming

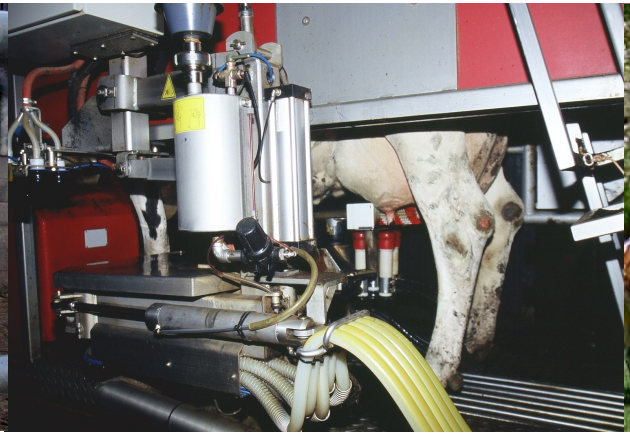
- **Milk + young bull** (100 ha, 400 000 l of milk quota)
  Intensive, maize feeding system, milk yield (8000 to 9000 l/cow)

- **Milk + cereals** (137 ha, 460 000 l of milk quota)
  Intensive, maize feeding system, milk yield (7500 à 8500 l/cow)

- **Semi-intensive** (50 ha, 290 000 l of milk quota)
  Small area, maize and grass, milk yield (7500 à 8500 l/cow)

- **Grazier** (78 ha, 285 000 l of milk quota)
  Extensive, based on grass, low milk productivity (5000 to 6000 l/cow)

# 3- Results

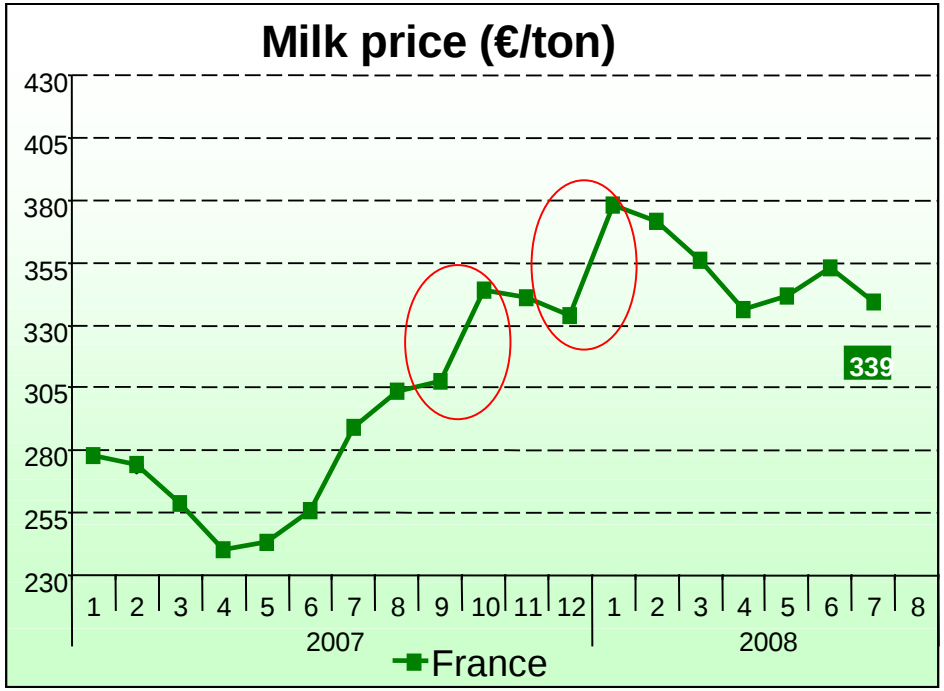



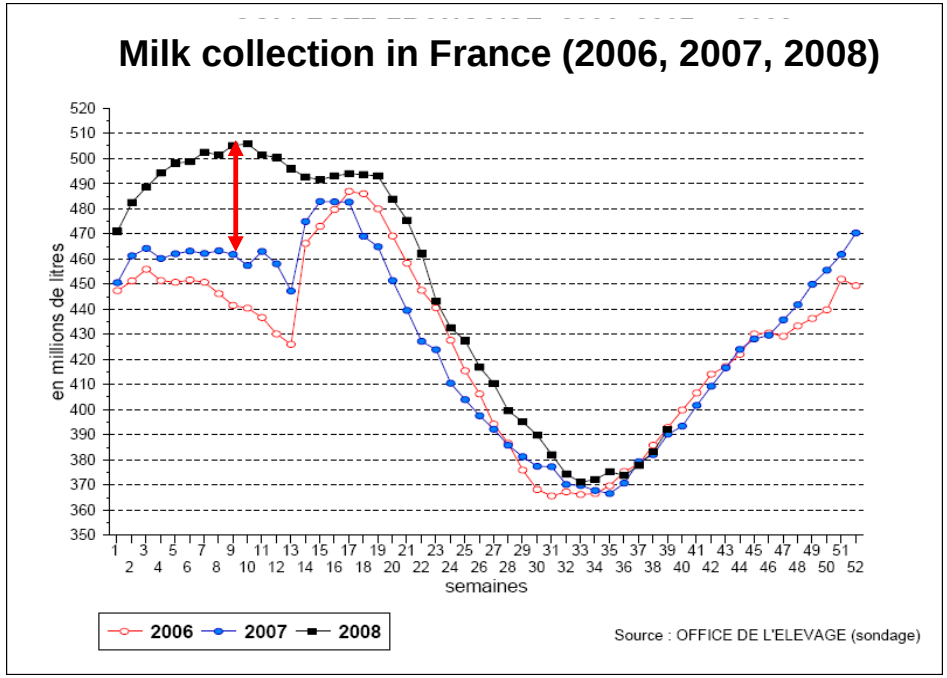

# Two considerations before our simulations

## Some studies exist already (partial and general equilibrium model)

**(Westhoff, 1998 ; Bouamra, 2008 ; Kleinhanss et al, 2002)**

- **The milk production increases (7 to 10%)…**
  **… but the price decreases (21 to 26%)**



# The model assumptions

## The main assumptions in our model

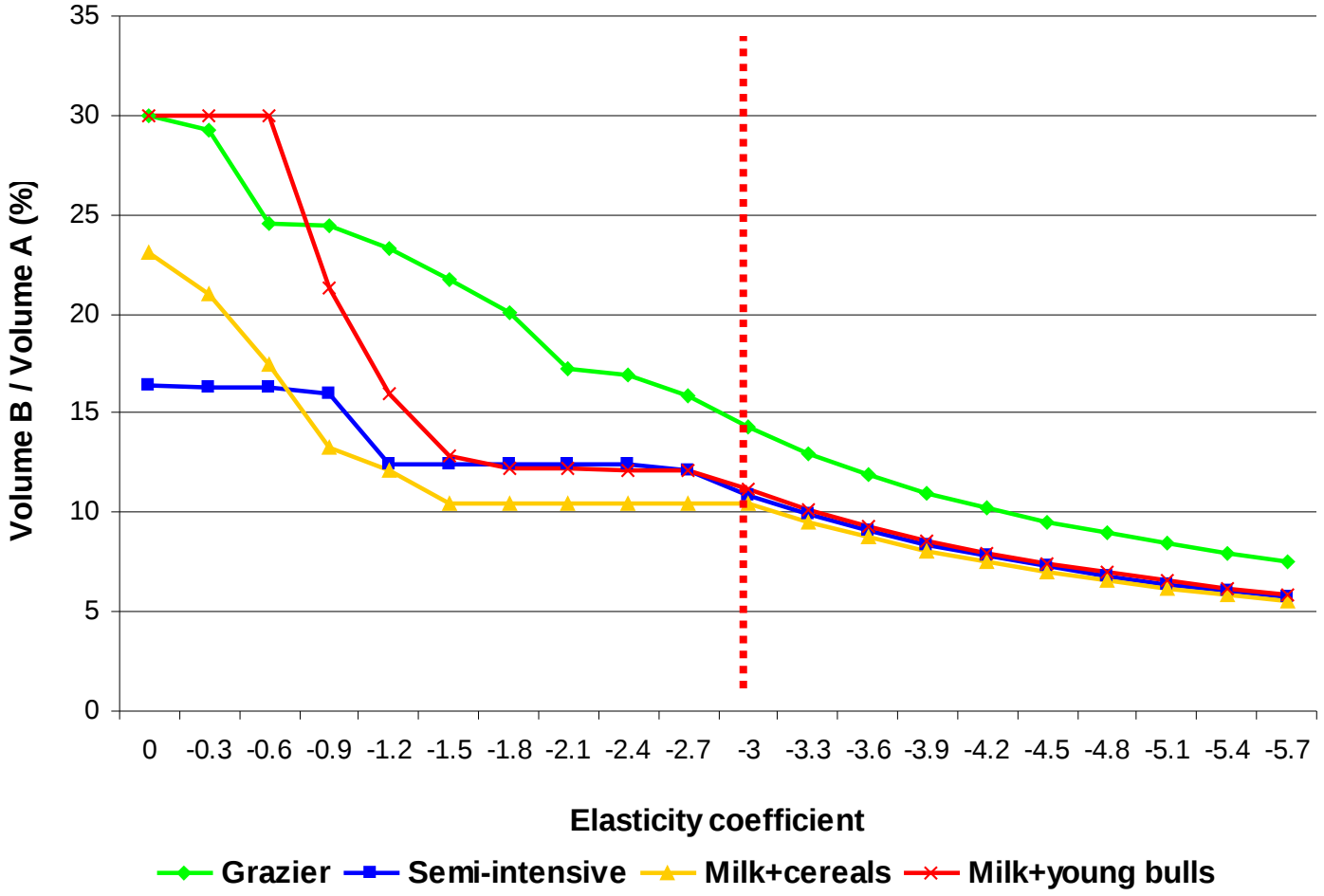
- **Base year 2007** (with full implementation of 2003 CAP reform)
- **Farmers have the possibility to increase the number of cows by 10% and +50% for the milk + young bull farm** (substitute young bulls by cows)

- **Contract double volume / double price**
  - **Volume A : historic quota with a fixed price (280 €/ton)**
  - **Volume B : price lower and more variable**

$$Milk\ Price\ Volume\ B = 280 \times \left(1 - \left(\frac{Volume\ B}{Volume\ A}\right) \times \alpha\right)$$

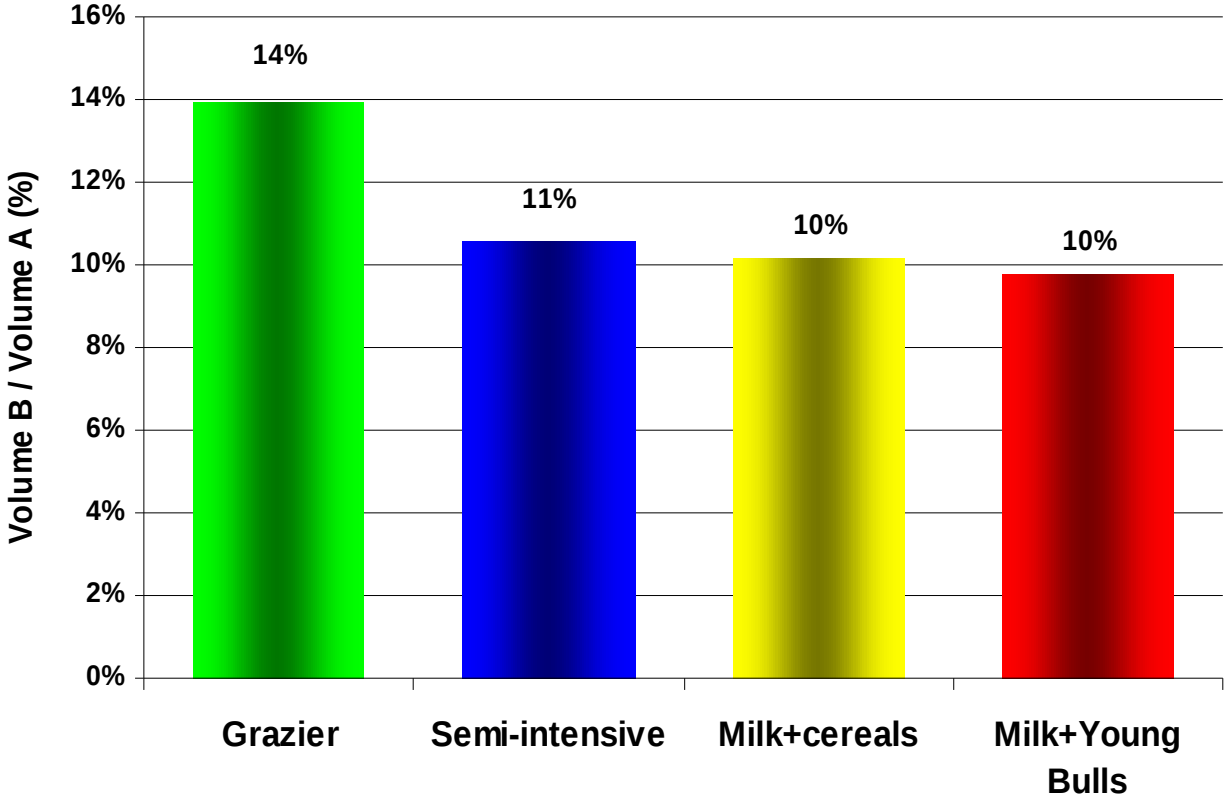
$\alpha$ **is the elasticity coefficient in order to avoid over production**

# Impact of the elasticity coefficient *(α)*




- **Dairy farmers react to different price conditions**
- **High production potential**

# High production potential with low prices



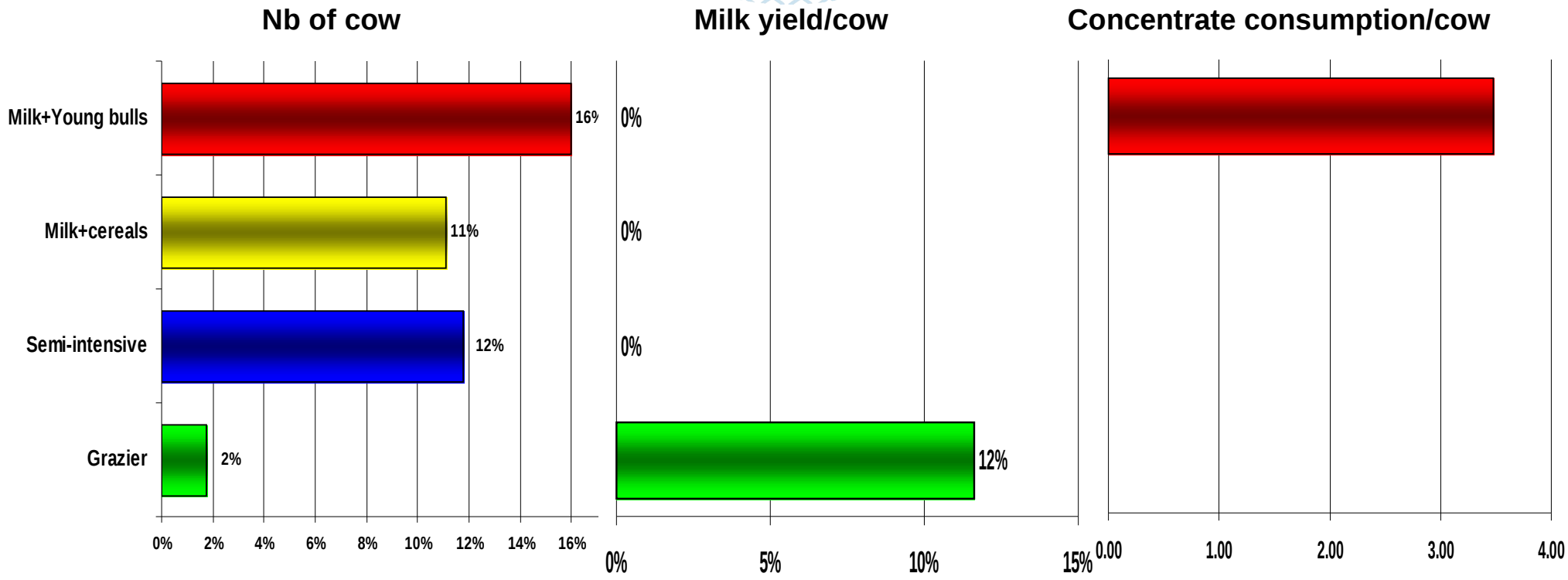

➢ **Equilibrium price for volume B**

- **Grazier : 160 €/t**
- **Semi-intensive : 189 €/T**
- **Milk + cereals : 192 €/t**
- **milk + young bull : 196 €/t**

➢ **Agricultural area of West of France farms increased by 52% for the last 10 years while the quota per farm increased by only 28%**

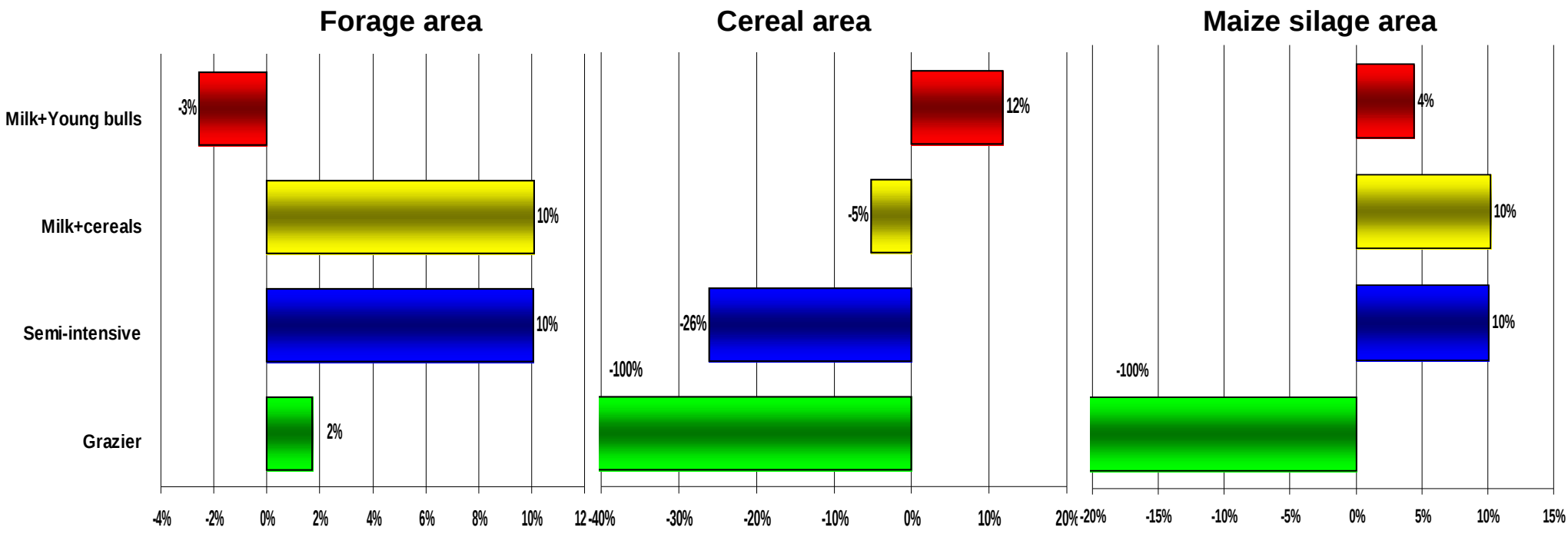
- **Diversification of the agricultural production**

# How to produce more milk ?




- More cows
- More milk per cow → with (a lot) more concentrate
- Less young bulls and less home produced milk for calves

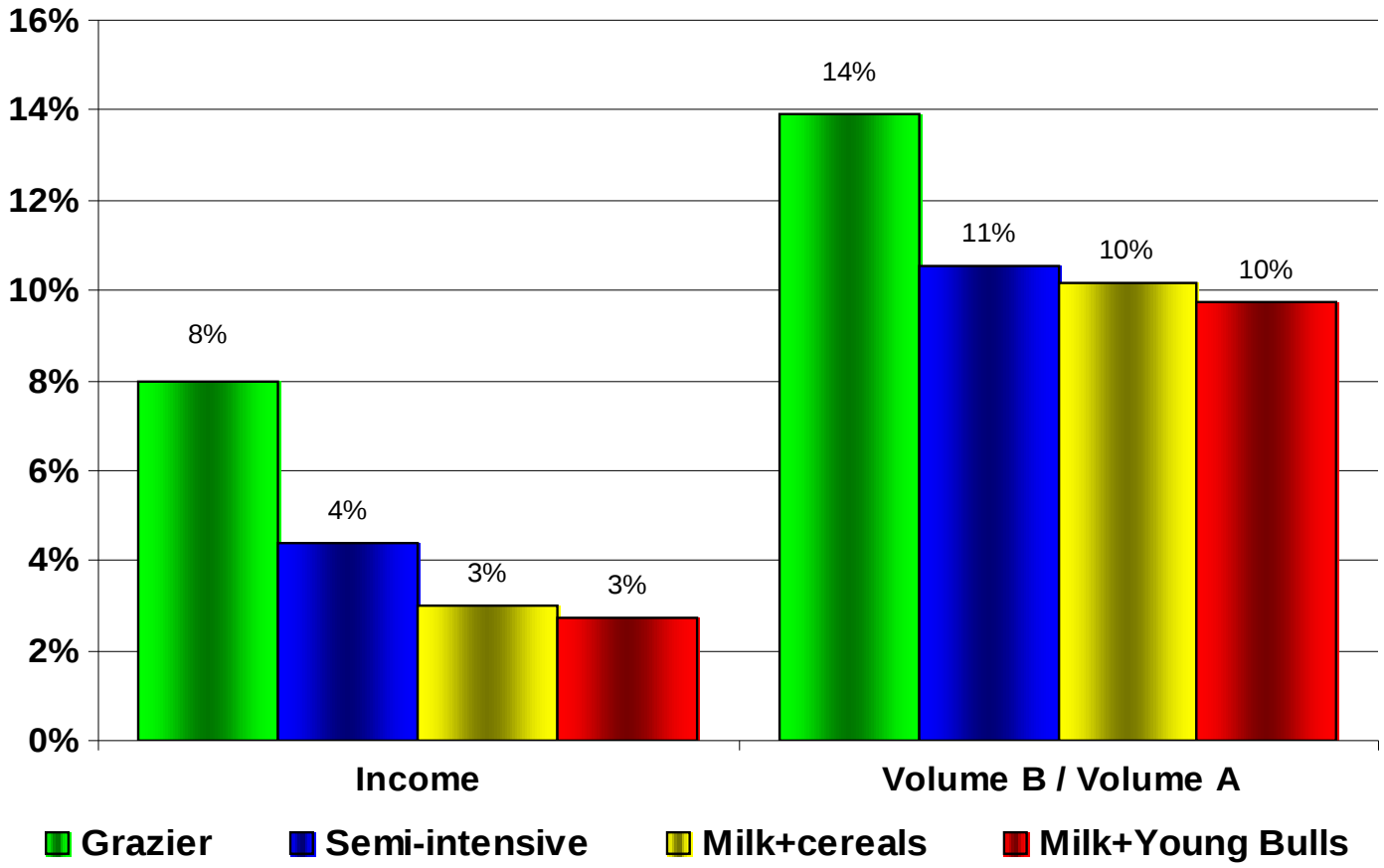
# How to produce more milk ? (impact on crop rotation)




- To feed the animal to produce milk : increase of the forage area
  - Decrease of cereals area
  - The maize area increase

# Impact of milk quota abolition (on economic results)

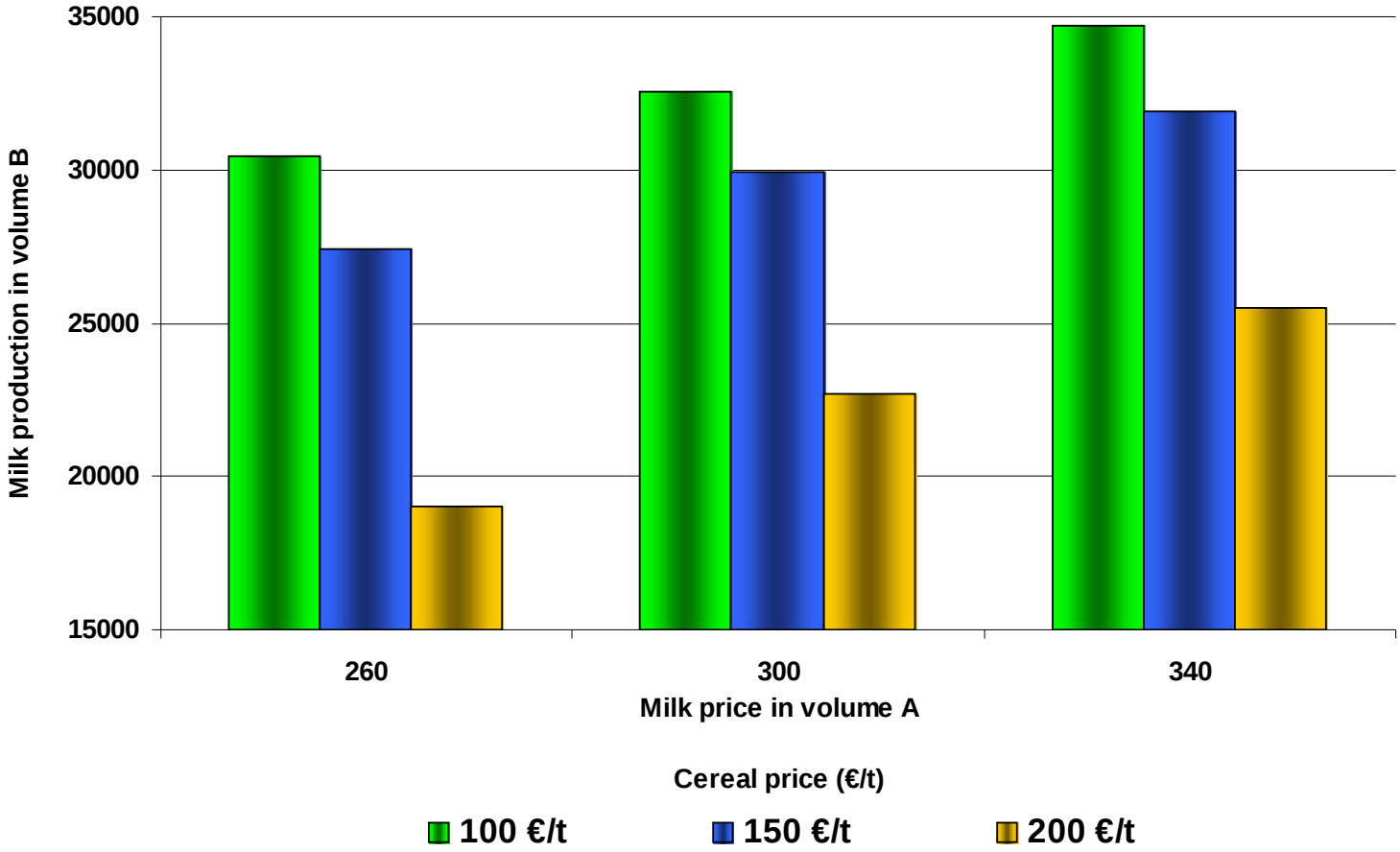
➢ **A better income but…**




- **Income increases proportionally less than milk quantity :**
  - **additional variable costs (dairy cows, concentrates)**
  - **losses (cereal crop replaced by forage productions)**

# Milk price for Volume A and competition with other productions

**Farm : Semi-intensive**




- The production in volume B is function of the milk price in volume A which guaranty the economic durability of the farm (fixed costs)
- Lower price : competition with cereal production

# 4- I need your help !



# Contract by the dairy processors

- **Volume A : 80% of the historic quota**
- **Volume B : variable and lower price**

- **The volume A (80%) must guaranty 90% of the reference income for farmers**
  - Security margin for the farmer
  - Cover the fixed costs engaged for a more important production
  - Give the choice for the farmer to produce (or not) milk in volume B

# Guaranty 90% of the income with 80% volume

- **Which milk price in volume A to assure 90% of the income**
  - **If apply a rule of 3 :**

    **80% volume → 90% income**

    **Milk price for volume A : 322€/ton for the four type of farming**

  - **Great difference if we run the model :**
    - **Grazier 355€/t : very rigid system, no possibility to develop other production with the free area**
    - **Semi-intensive 315€/t**
    - **Milk+Cereals and Milk+Young bulls 295€/t : those types of farming can develop cereal and beef production with the free lands**

**322€/t for all the type of farming : not possible to give different prices for the volume A**

# Quantity and equilibrium price in volume B

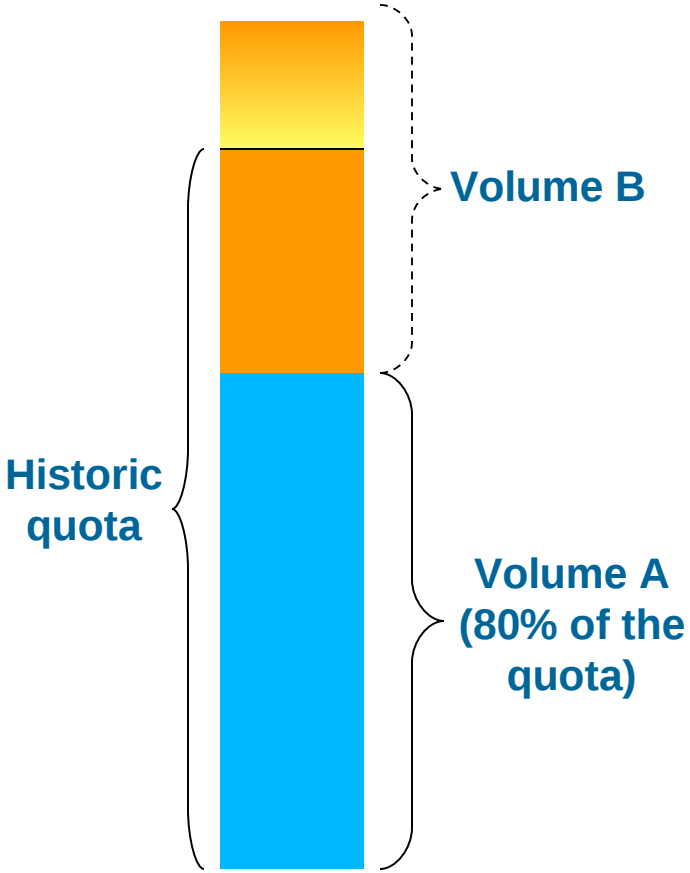
| | Grazier | Semi-intensive | Milk+cereals | Milk+Young bulls |
|---|---|---|---|---|
| Equilibrium price for volume B | 180,8 | 208,2 | 212,8 | 205 |
| Milk production in volume B | 43 500 | 33 000 | 50 500 | 47 100 |
| Global production (A+B) / historic quota | 95 % | 91 % | 91 % | 92 % |

**Price are a little higher than the previous simulation (+15€/t)…**

**… but the global production (A+B) is lower than the historic quota**

**Problem with the elasticity coefficient (I kept $\alpha$ = 3)**

# How to get a good elasticity coefficient ?



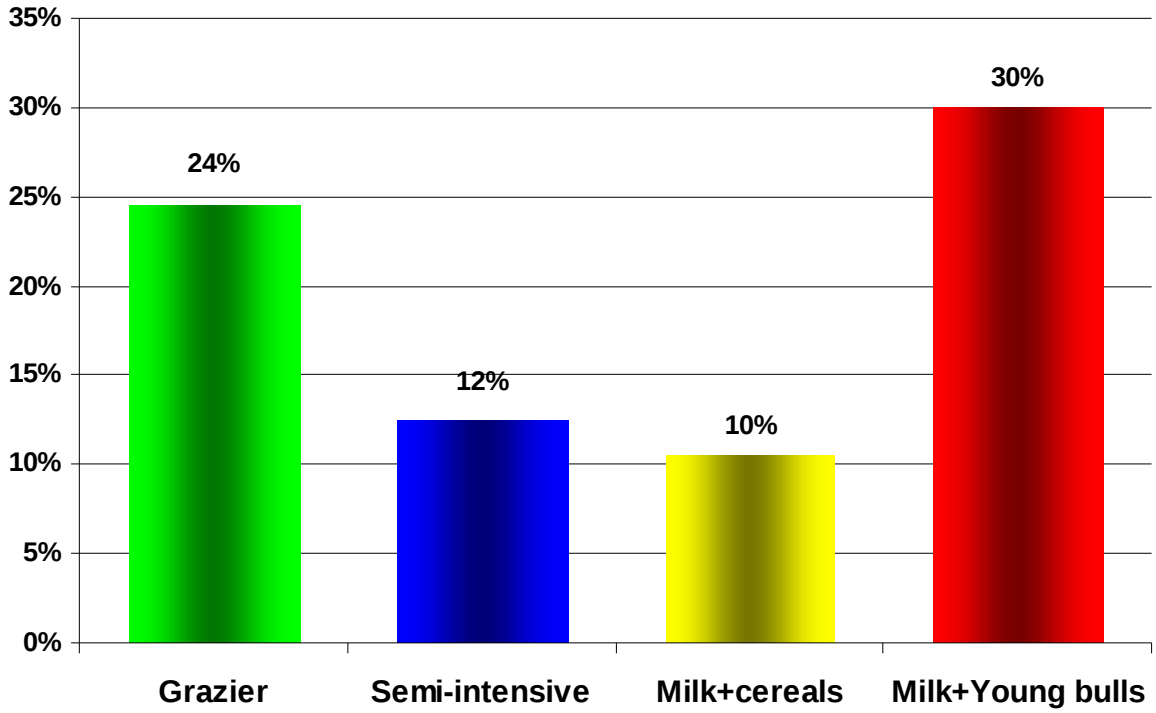

- The volume A is lower than the historic quota
- The milk price in volume B has to be function of the volume B (decreasing)
- How to decrease the price in volume B if the global production (A+B) is lower than the historic quota (normally the price decreases only if the volume is higher than the reference)

## How to determine the elasticity coefficient

- $\alpha$ constant but lower
- $\alpha$ linearly increasing
- $\alpha$ non linearly increasing

# We need $\alpha$ !

**Increase in milk production for a milk price in volume B: 210€/t**




- Without $\alpha$ the production potential is very important
- Farmers try to saturate the production constraints (building for the semi-intensive and milk+cereals ; land for the grazier and the milk+young bulls farm) : the milk price is stable given any volume produced
- The milk price cannot be constant with a great increase in volume

# 5- Conclusion



# Conclusion

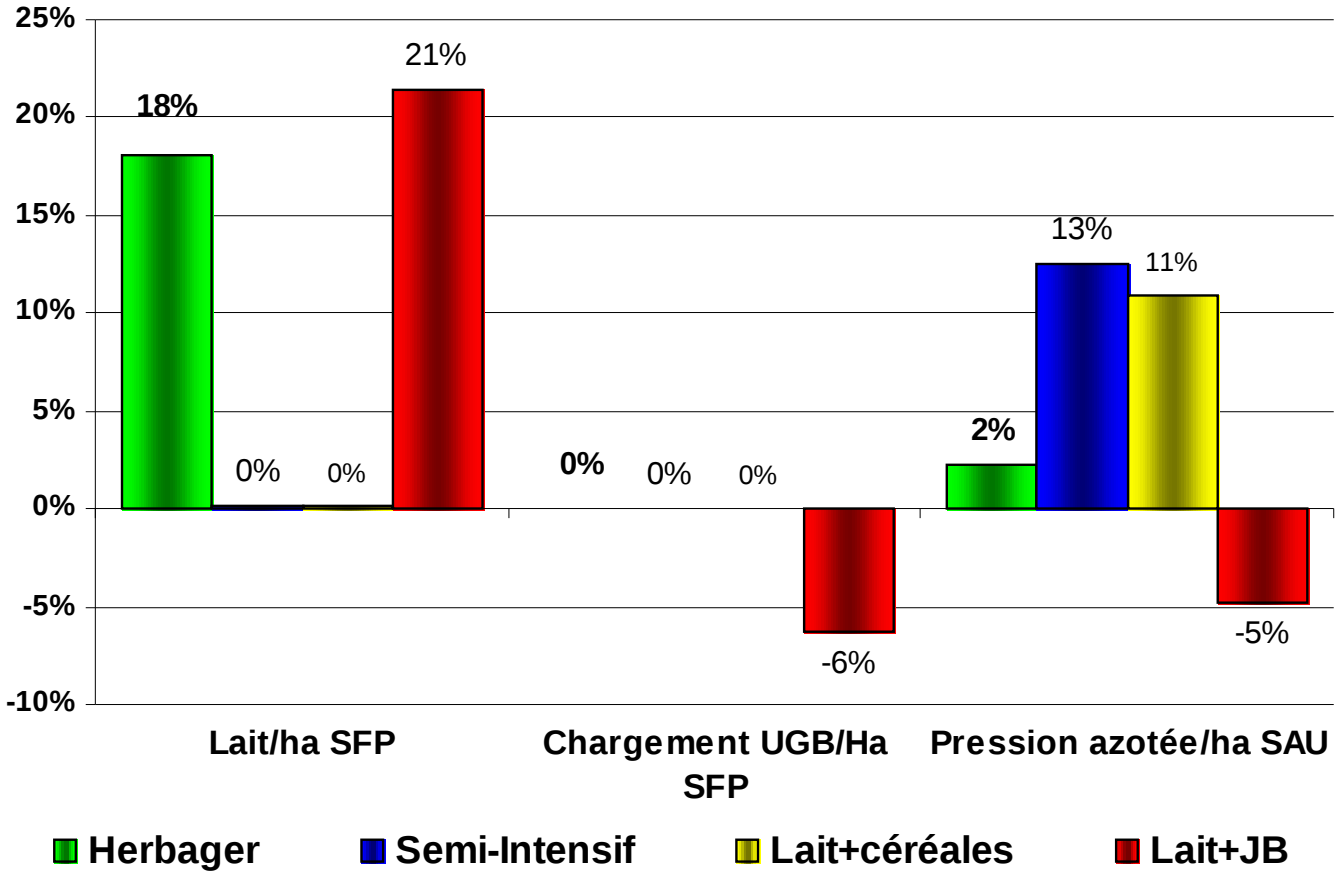
- **This model enables to discuss**
  - The dairy farmers' behaviour face to new rules for the CAP
  - The substitutions between productions under price variations
  - The impact of different constraints on the farmers strategies

- **Some improvements are necessary**
  - The way how farmers anticipate prices
  - Four types are not enough to represent the global diversity of systems

- **The end of the milk quotas : an important public decision**
  - The distribution of the milk production between regions
  - The restructuring of farms and its environmental impact
  - The way to control the milk supply (from public regulation to private)

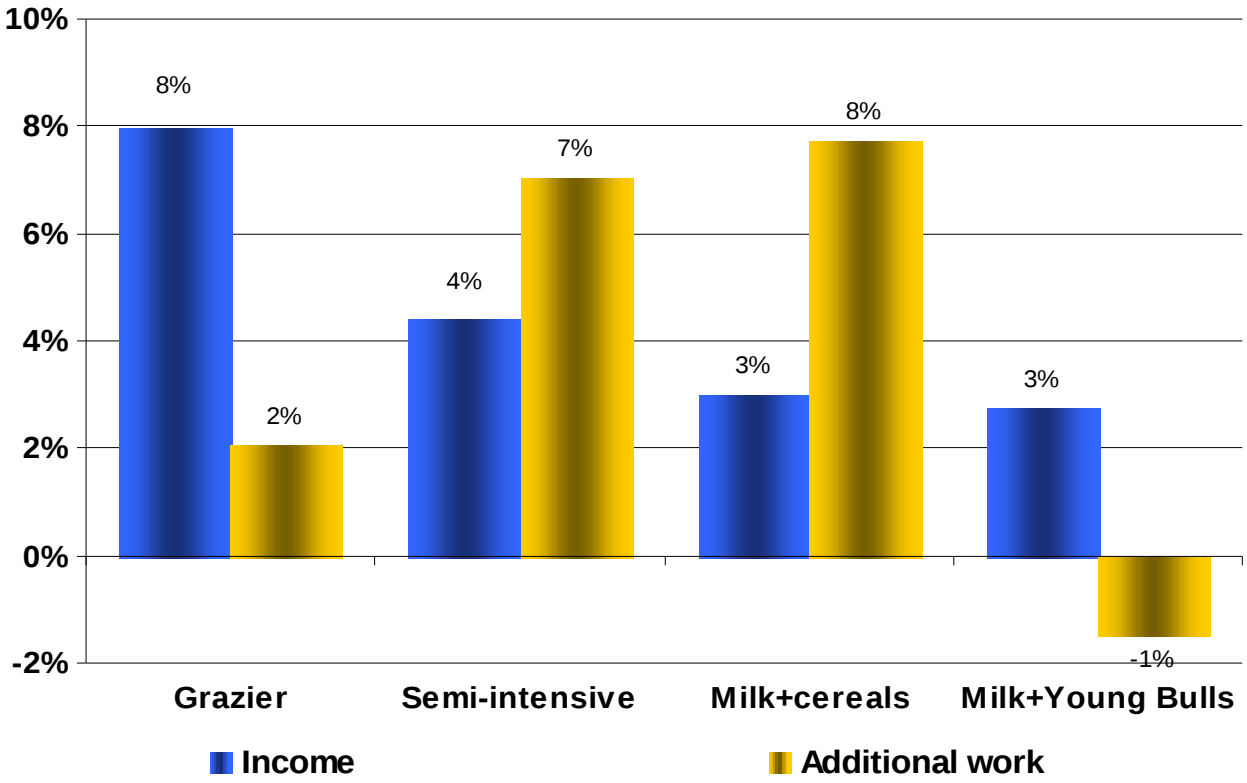
# Thanks for your attention

# Impact of milk quota abolition (on environmental indicators)



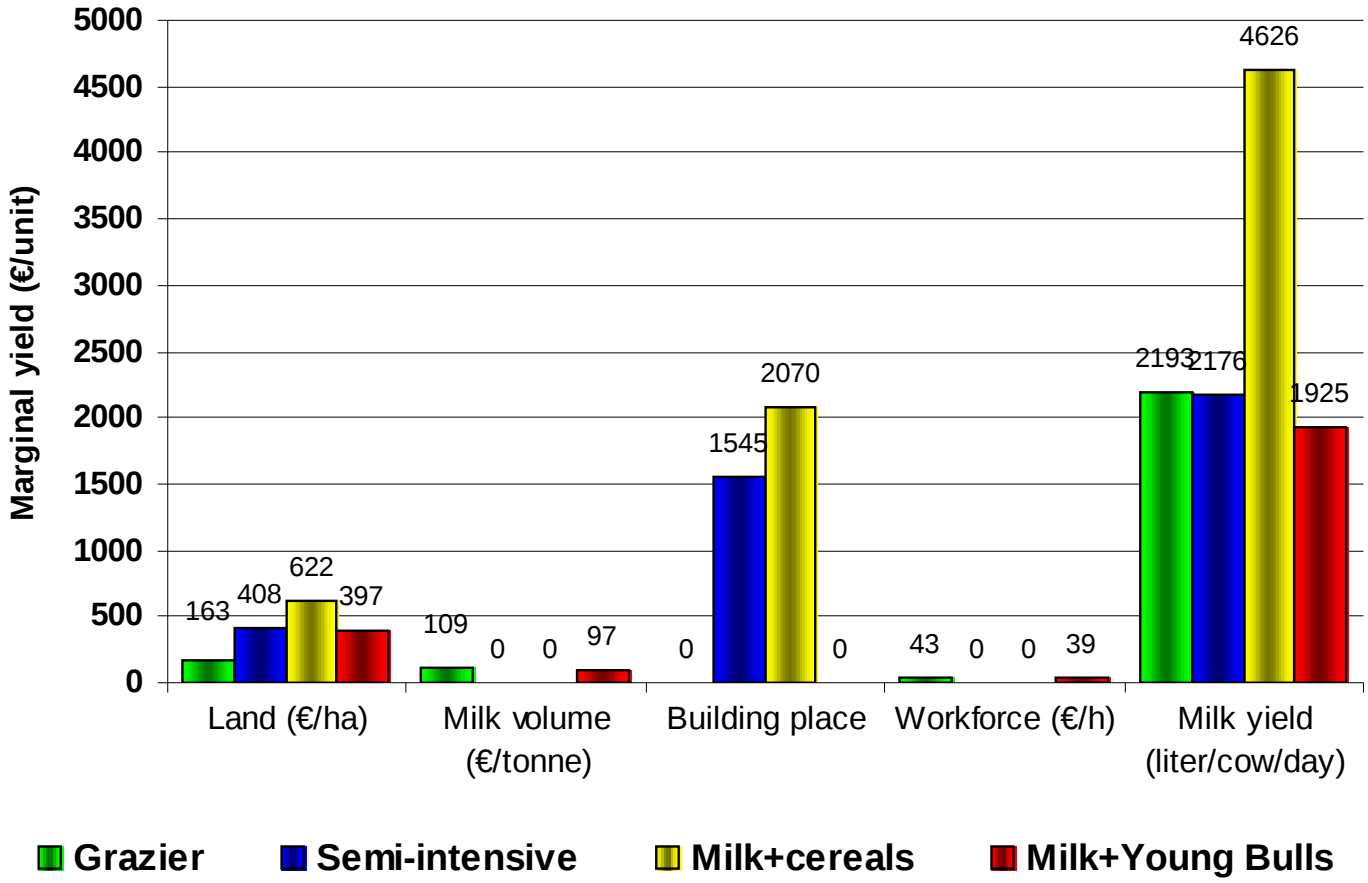

- Intensification of the dairy production
- Low impact on environment : increase of the forage area
  cows replace young bulls

# Very different working conditions



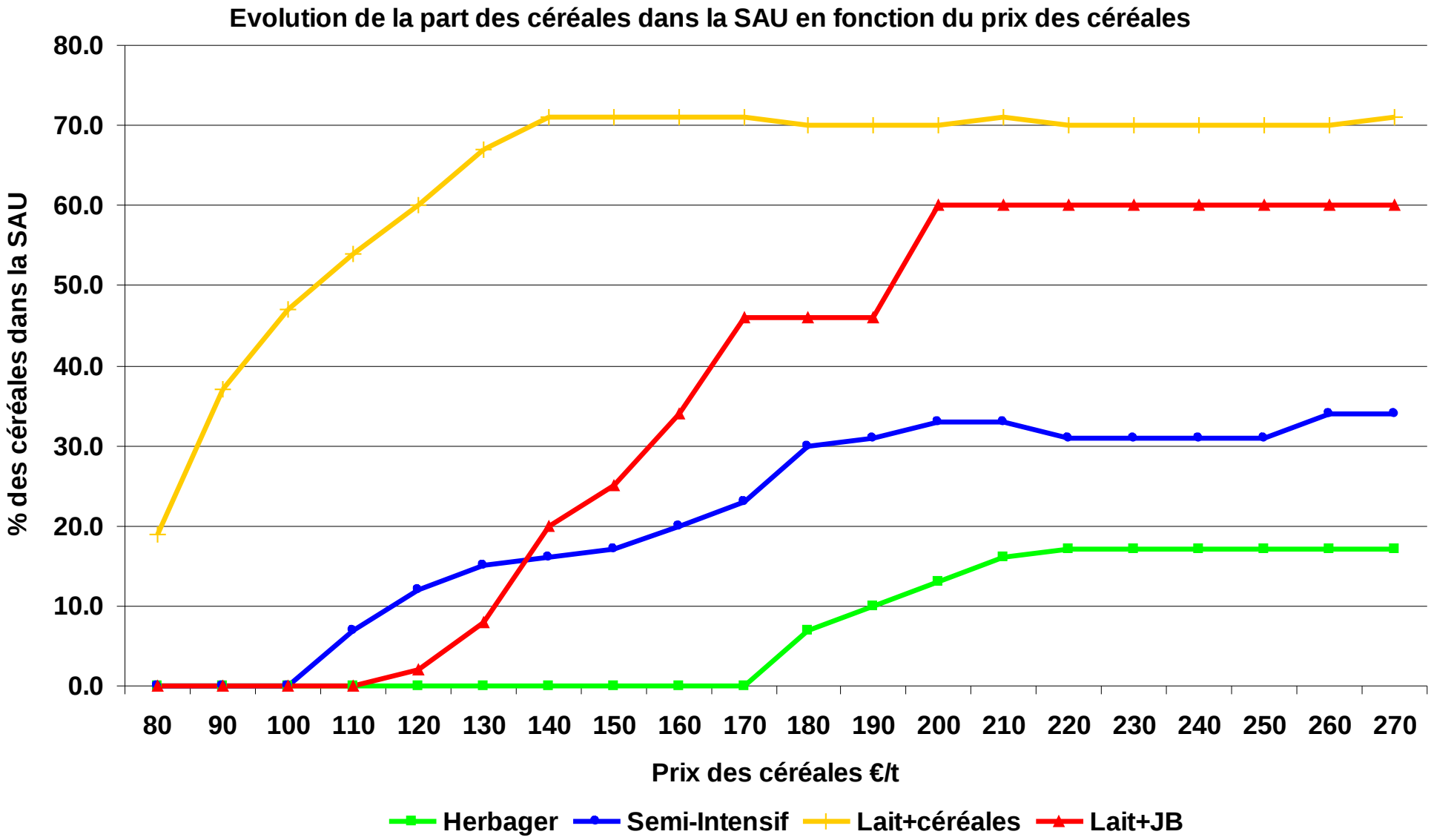

- **Semi-intensive and Milk+cereals: income increase proportionally less than the additional work**
  - **Additional cows and forage area**
- **Grazier and Milk+young bull: more room of manœuvre (milk yield and decrease of the nb of young bull)**

# The constraints to produce milk




- **The most important constraint : the milk yield per cow**
  - **Economic gain permitted by the genetic level of animals : a higher quantity of milk at a lower cost**

# Competition with cereals



# Contractualisation double volume : discussion

## How to manage the volume A

- Price
- Length of the contract (time) : dairy production is a long cycle activity
- Volume and volume transfer between farmers (no more link to the land)

  Free attribution to farmer according to criteria: milk quality, volume, collecting distance…

  Progressive replacement of volume A by volume B

## How to manage the volume B

- Price (fixed price, variable price)
- Production planification during the production season (distribution between volume A and B)