# Technical and economical consequences of extended (18m) calving intervals for dairy cows

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# Technical and economical consequences of extended (18m) calving intervals for dairy cows

# From an unvolontary extended calving interval (CI)...

**3 main dairy breeds, France**
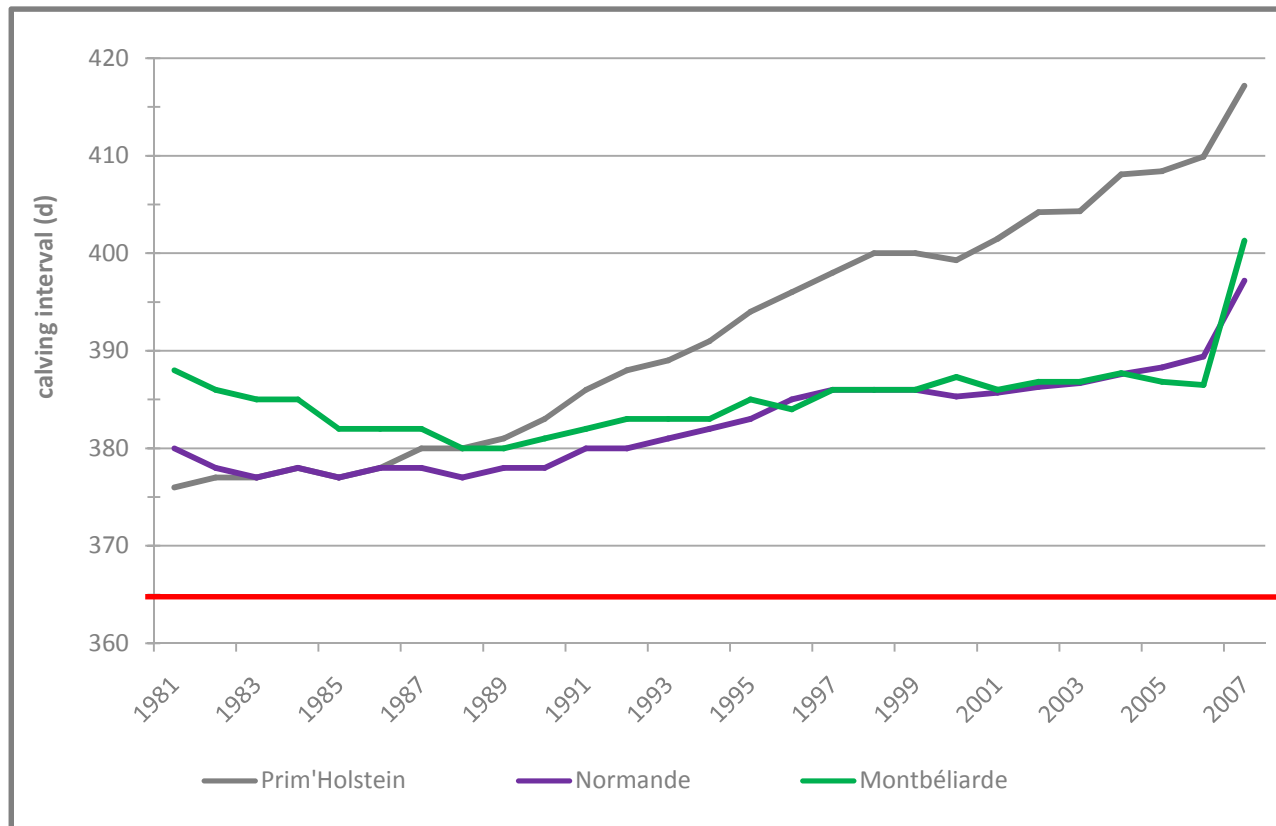


Hol 418 days

Mo 402 days

Nor 397 days

365 days

*Source : Le Mezec P. Idele, 2011*

# ...to a volontary extended one

- A strong decrease in cows fertility

- Compact calving patterns hard to manage

- Dry off has to be done with still high production level

- Most of the health troubles occur around calving period, early lactation = high risks

→ **Can the decrease in calving frequency through extended calving intervals be a solution ?**

# New economic background

▶ **Milk prices moving, high input costs :**

  ▶ farmers must adapt their dairy production and milk deliveries to the fluctuations of markets :

**« Fléxisécurité » = " flexible and secure " production**

Technical solutions ?

# Technical and economical consequences of extended (18m) calving intervals for dairy cows

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# Extending calving intervals up to 18 months in a compact calving situation

- **A 6 years experiment led in Trevarez experimental farm (Brittany, France)**
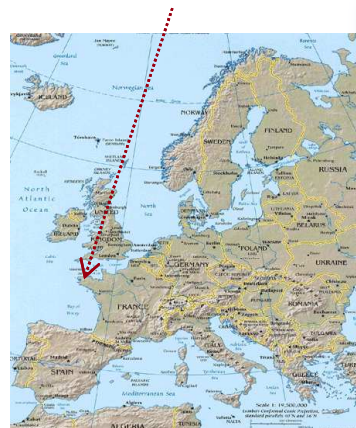
☞ **Which technical and economic consequences of extended intervals (18 m) compared to 12 m intervals ?**

# Material and methods



- **A 6 years experiment : 2005-2011**

- **2 groups of 24 Holstein cows  (30% primiparous cows)**

  - 12 months group : CI of 12 m

  - 18 months group : CI of 18 m

- **Compact calvings (3 months)**

- **Same forage system : 0.15 ha of grazed grass per cow, maize silage all year long,  800 to 1,000 kg of concentrate per cow per year.**

# Experimental pattern : data registered + analysed

- **Technical criteria:**

    *Intake → forage areas*

    *Dairy Production (incl. SCC) → cows number*

    *Weight and body condition*

    *Reproduction*

    *Health troubles          → culling rates*

- **Economic criteria:**

    **Economic simulations of the effects of extended CI** (deliveries, income, variable costs)

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# Lactations over the 6 years

| Lact. ended | Primiparous | Multiparous | Total |
|---|---|---|---|
| 12 m | 41 | 89 | 130 |
| 18 m | 28 | 58 | 86 |
| Total | 69 | 147 | 216 |

Reproduction 218 lactations / health 222 lactations

# Statistical analyses

- **Dairy production → total and yearly performances:**

$$\text{Yearly milk produced} = \frac{\text{total milk per lactation}}{\text{lactation duration + fattening duration}} \times 365 \text{ jours}$$
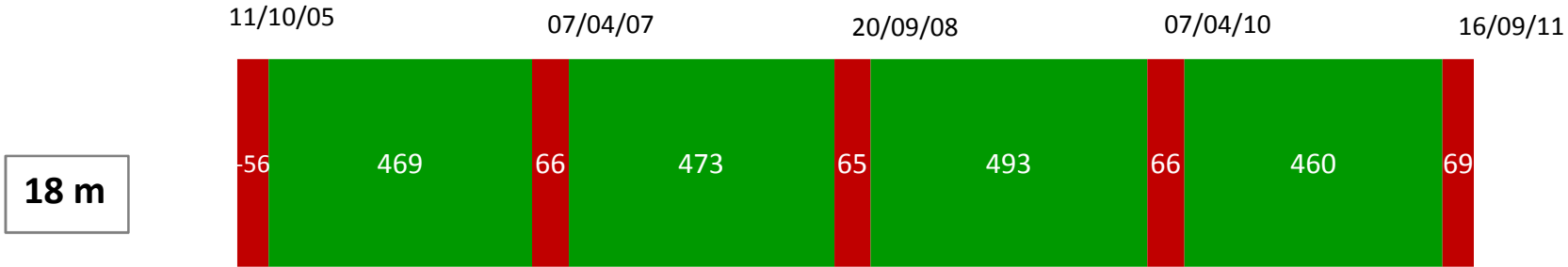
ANOVA – *mixed*

- **Reproduction**

- **Health troubles (scores)**     Logistic reg, survival tests

# More time spent in lactation in the 18m group

**(days)**

11/10/05        07/04/07        20/09/08        07/04/10        16/09/11

**18 m**

-56 | 469 | 66 | 473 | 65 | 493 | 66 | 460 | 69

*4 calvings, alternatively autumn and spring*

**12 m**

-75 | 284 | 82 | 289 | 74 | 301 | 78 | 312 | 56 | 323 | 52 | 295 | 67

12/10/05    06/10/06    02/10/07    04/10/08    29/09/09    01/10/10    28/09/11
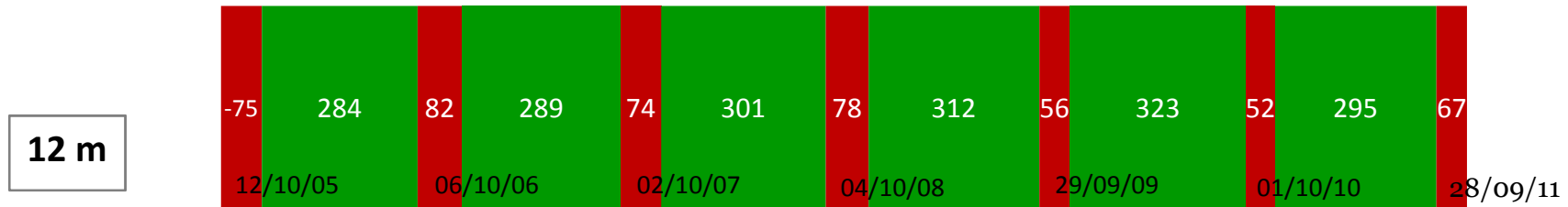
*6 autumn calvings*

**Lactating**
Dry off

***Time in lactation*: 81% for the 12 m group
88% for the 18 m group**

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# Intakes : no difference between the two groups, same forage areas required
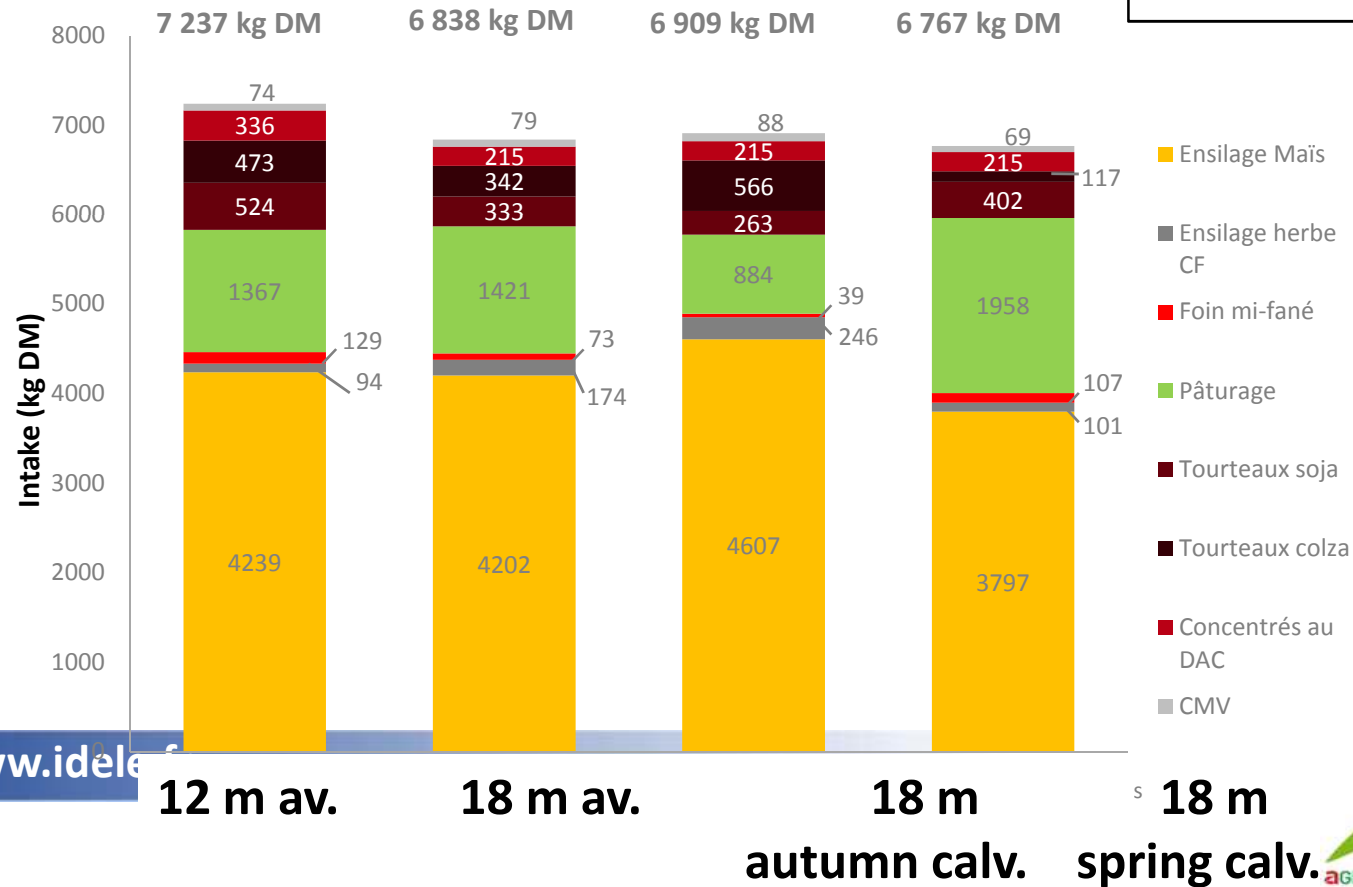
- **The only difference occurs within the 18m group : spring vs autumn calvings**



Average yearly intakes per group

| | | | |
|---|---|---|---|
| 7 237 kg DM | 6 838 kg DM | 6 909 kg DM | 6 767 kg DM |

Legend:
- Ensilage Maïs
- Ensilage herbe CF
- Foin mi-fané
- Pâturage
- Tourteaux soja
- Tourteaux colza
- Concentrés au DAC
- CMV

12 m av.      18 m av.      18 m autumn calv.      18 m spring calv.
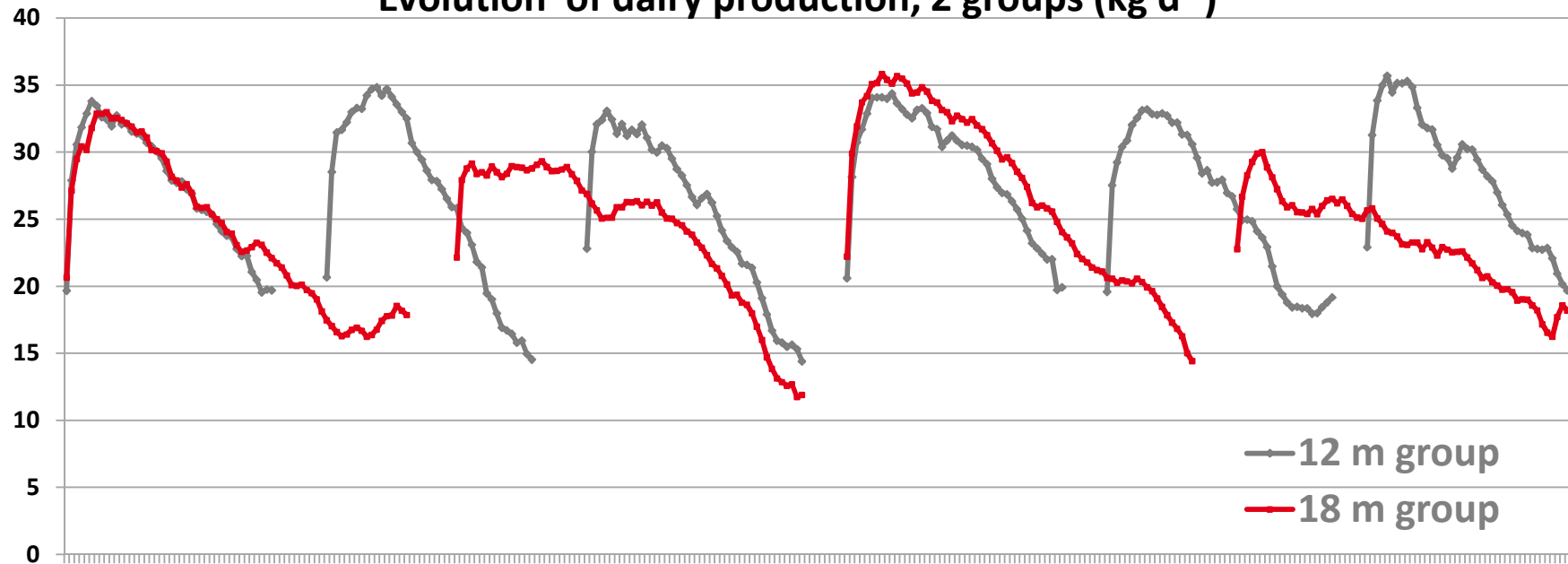
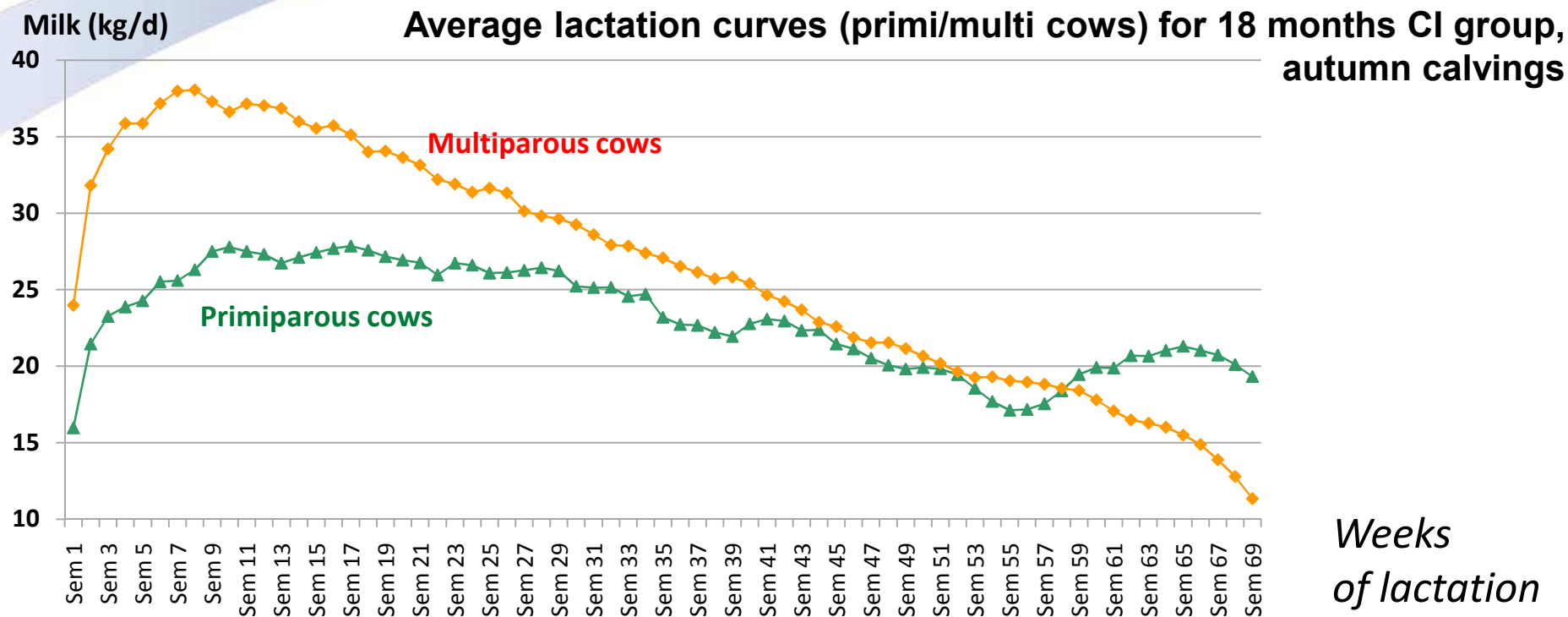# 18 m : flattened peak with spring calvings

## 12 m group : 6 very similar curves



**Evolution of dairy production, 2 groups (kg d$^{-1}$)**

Legend:
— 12 m group
— 18 m group

X-axis: 11/10/05, 25/04/06, 07/11/06, 22/05/07, 04/12/07, 17/06/08, 30/12/08, 14/07/09, 26/01/10, 10/08/10, 22/02/11

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# 10 to 20 kg milk per day after 16 months of lactation

**Milk (kg/d)**

**Average lactation curves (primi/multi cows) for 18 months CI group, autumn calvings**



Multiparous cows

Primiparous cows

*Weeks of lactation*

🔻**Extending lactations up to 16 months : a realistic target**

*(with Holstein cows and high quality diet)*

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# A higher protein content per lactation with extended lactations

- *Anova adjusted means (% parity profiles)*

| per lactation | Milk (kg) | Fat content % | t Protein content % |
|---|---|---|---|
| 12 m group | 8,287 | 4.09 | 3.18 |
| **Difference** (18 m – 12 m) | **+2,898** | -0.02 | **+0.09 (S)** |

Model / *SAS mixed repet*

Yearly milk = group + parity+ repet (group) + period + milk_potential (cov) + interactions

# Less milk and milk solids per year with extended lactations

| Anova adjusted means | | Total group (216 lactations) | Primiparous cows (69 lactations) | Multiparous cows (147 lactations) |
|---|---|---|---|---|
| Milk per year 365 d (kg) | 12 m group | 8,508 | 7,209 | 9,088 |
| | Difference (18 m – 12 m) | - 640 (S) | +156 | -893 (S) |

Less milk solids per year :   - 40 kg Fats (S)

-19 kg Proteins (S)

Model / *SAS mixed repet*

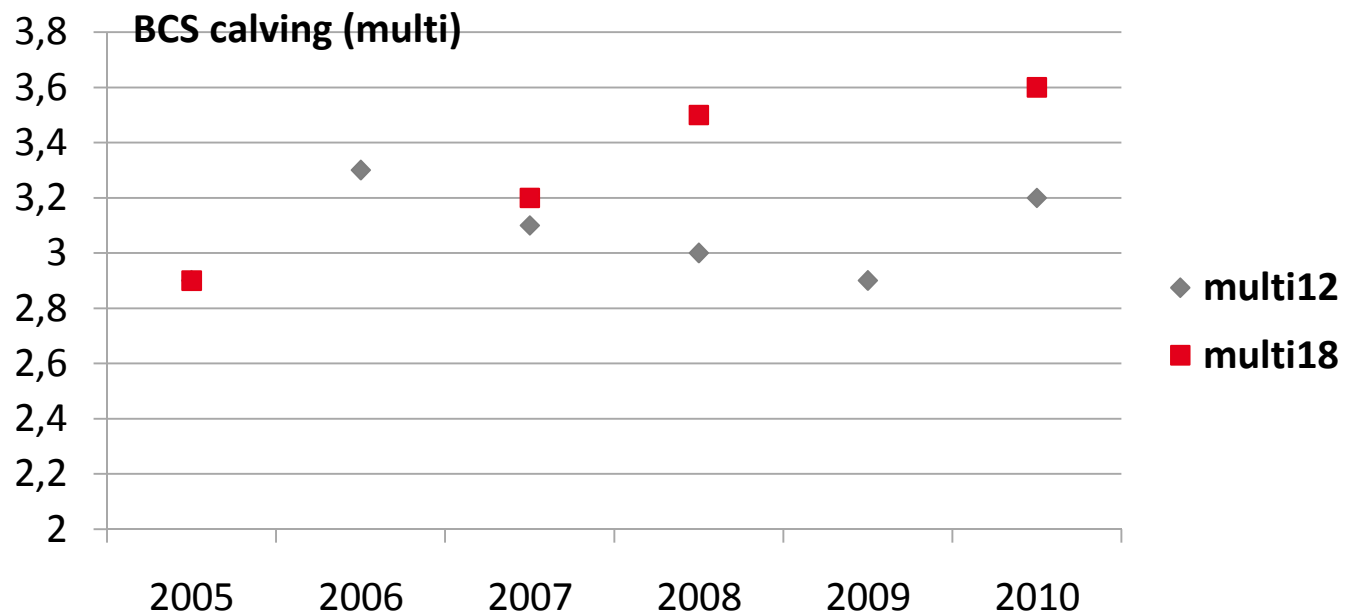Yearly milk = group + parity+ repet (group) + period + milk_potential (cov) + interactions

# Less milk solids per year with extended lactations

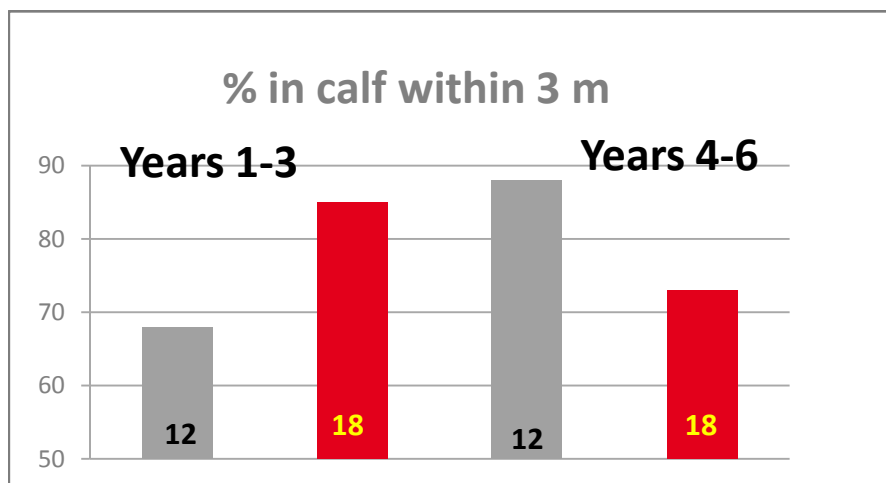| *Anova adjusted means* | | Total group (216 lactations) | Primiparous cows (69 lactations) | Multiparous cows (147 lactations) |
|---|---|---|---|---|
| Fats (kg) 365 d | 12 m group | 335 | 280 | 353 |
| | Difference (18 m – 12 m) | - 40 (S) | -6 (NS) | - 34 (S) |
| Proteins (kg) 365 d | 12 m group | 225 | 221 | 271 |
| | Difference (18 m – 12 m) | - 19 (S) | + 5 (NS) | -21 (NS) |

# Body weight and condition scores

- **Body condition scores for 18m multiparous cows increase calving after calving**
  - A seasonal effect within the 18m group (24m spring calving heifers = the lightests)



**BCS calving (multi)**

◆ multi12
■ multi18

www.idele.fr  **Farmers must pay attention to BCS at late lactation**

# Same reproduction results over the 6 years period

| | AI within 3 first weeks of mating period | Interval "start of Ais – in calf" | Conception rate | | In calf within 3 months |
|---|---|---|---|---|---|
| | | | AI 1 | AI1+AI2 | |
| 12 m group | 70% | 35 d | 51% | 79% | 85% |
| 18 m group | 80% | 28 d | 59% | 75% | 79% |

● **Opposite results 3 first years / 3 last years.**



% in calf within 3 m

Years 1-3    Years 4-6

Compact calvings

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# Health troubles: period analysed

**Calving**                                                                                          Calving

Start of
experiment

Start of
mating period
for 12m group

3 months

**3 months**

**Period
analysed**
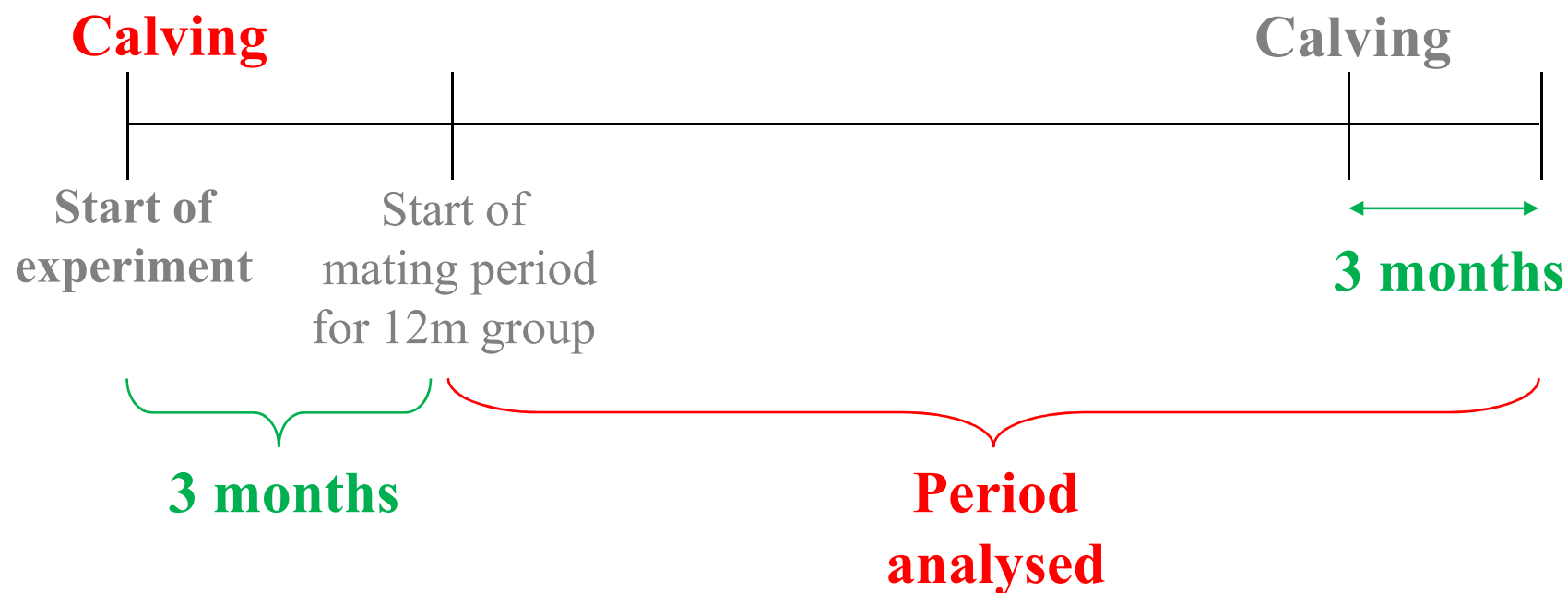
Stat models include « problems around calving » and « hormonal
treatments » (reproduction)  as explicative factors

# Health troubles: no impact

*adjusted means*

Total scores, 6 yrs

| | mastites | lameness | total |
|---|---|---|---|
| 12 m | 1,9 | 0,9 | 5,6 |
| 18 m | 1,7 | 1,1 | 5,6 |

- No positive effect of extended lactations on health troubles frequency (more troubles per lactation)

- More feet problems with extended lactations (S for multiparous cows).

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# Cell counts: limited economic impact

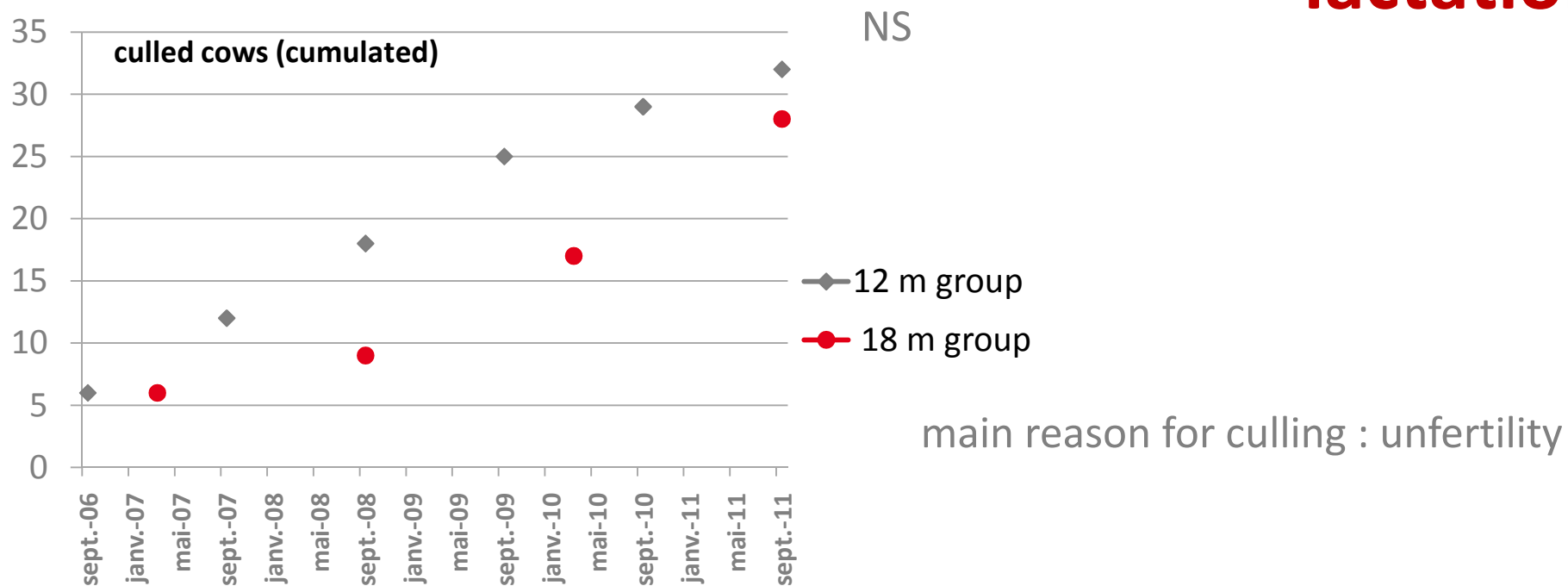| Status of udder at dry off (6 yrs) | 3 SCC <300 000 c/ml "sane" | 1 or 2 >300 000 c/ml "doubtful" | 3 SCC >300 000 c/ml "infected" |
|---|---|---|---|
| 12 m group | 59% | 24% | 17 % |
| 18 m group | 53% | 19% | 28% |

- **Less sane udders at dry off, more infected ones**

- **No important economic impact for farmers (2 months of penalties over 250.000 c ) in 6 years time !**

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# Cows getting older and older in the 18m group

| Average age of groups in September 2010 | | |
|---|---|---|
| | **Multiparous cows** | group |
| 12 m group | 4.3 | **3.8** |
| 18 m group | 6.2 | **5.0** |

| Number of culled cows during experiment (6 yrs) | |
|---|---|
| 12 m group | 32 |
| 18 m group | 27 |

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# Increased longevity with extended lactations

NS

**culled cows (cumulated)**

35
30
25
20
15
10
5
0

sept.-06 | janv.-07 | mai-07 | sept.-07 | janv.-08 | mai-08 | sept.-08 | janv.-09 | mai-09 | sept.-09 | janv.-10 | mai-10 | sept.-10 | janv.-11 | mai-11 | sept.-11

◆ 12 m group

● 18 m group

main reason for culling : unfertility

● **More culled cows in the 12 m group during 3 first years, more in the 18m group during the 3 following years**

● **Culled cows 1 year older in 18m group**

● **Same price for culled cows, shorter fattening period in 18m group**

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# Economic evaluation within the French background : method

- Agricultural area : 60 ha
- Quota : 300 000 l per yr

Average technical results
6 lactations of 12 m group

Average technical results
4 lactations of 18 m group

Dairy gross margin »

Dairy gross margin

Crops and their fixed costs

Farm margin over the 6 yrs

Farm margin over the 6 yrs
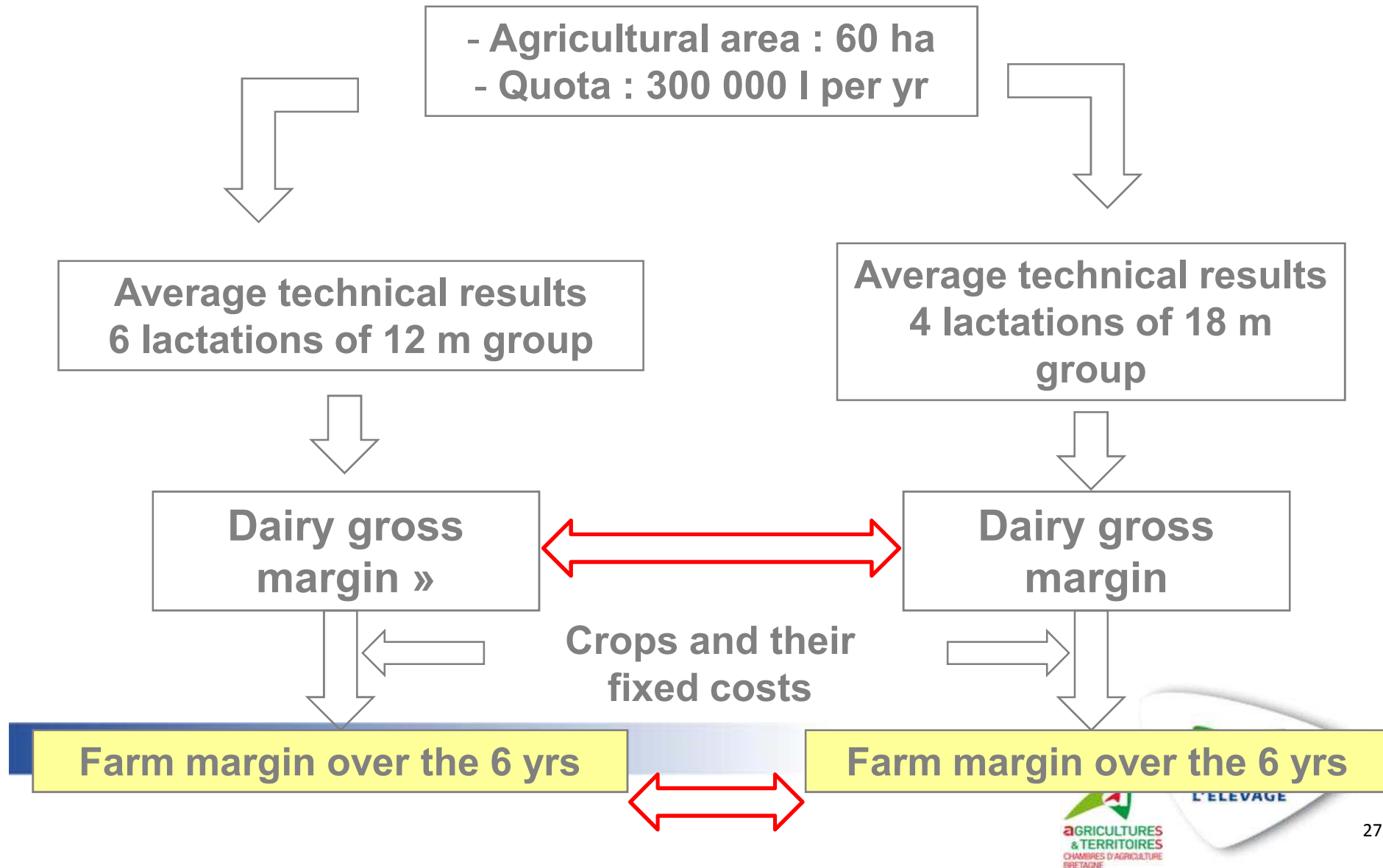
# A slight economic positive impact of extended lactations

- **A higher milk price (+ 13 € per t) in the 18 m group**
  - A higher protein content (+8 €) and a more profitable seasonal pattern (milk deliveries in summer)



Milk deliveries (l) per month

18 m_spring

12 m

18 m_aut
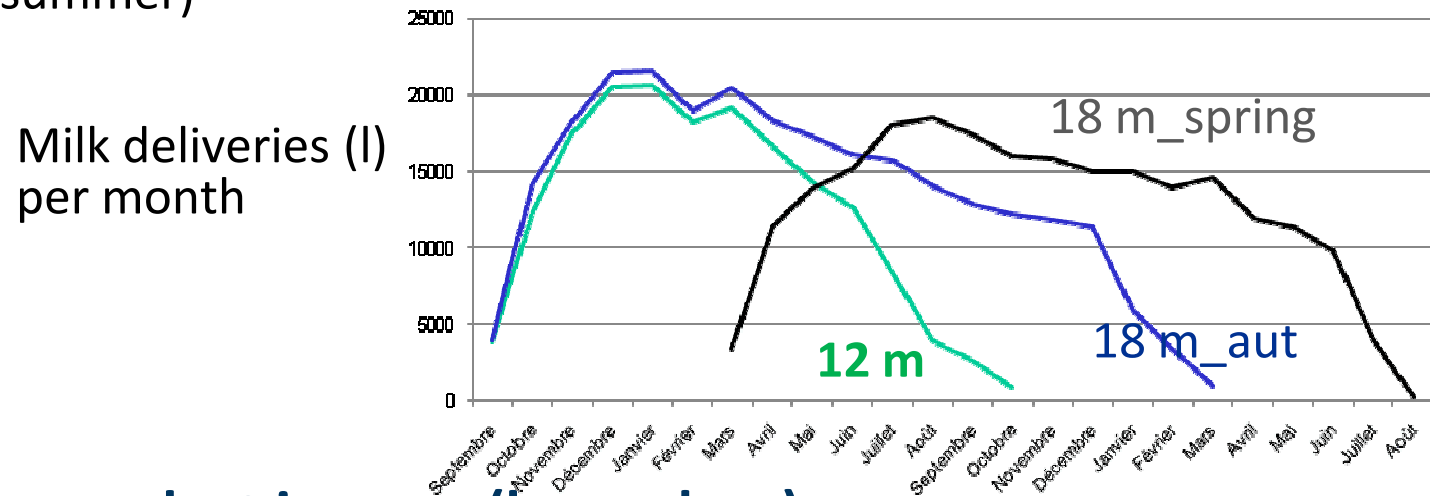
- **A reduced by product income (less calves)**

- **Well monitored variable costs (only 4 periods of early lactation = with production concentrate)**

- **A reduced heifer cost (4 teams instead of 6)**

# Economic evaluation : positive impact of extended lactations

| Simulation for 6 years | 12 m group | Difference (18 m – 12 m) |
|---|---|---|
| **Products (€)** | **750,000** | **+16,000** |
| *Including Milk (€)* <br> *Milk price per 1000l* | *595,200* <br> *330* | *+25,000* <br> *+13* |

| | | |
|---|---|---|
| **Variable costs (€)** | **197,500** | **-5,100** |
| *Incl feeding cost (€)* | **140,200** | **-4,200** |

| | | |
|---|---|---|
| **Dairy gross margin (€)** | **552,500** | **+21,100** |

| | | |
|---|---|---|
| **Forage area (ha)** | **166** | **+2** |
| **Farm margin (€)** | | **+19,600 €** <br> **= +3,270 € per year** |

# Technical and economical consequences of extended (18m) calving intervals for dairy cows

# A surprising positive economic impact

- **1 calf per cow per year no longer the most economic efficient solution : diverging result from former simulations**

- Sensibility analyses: main variation factors can decrease the difference but not reverse it.

> **Farmers advice : extended lactations are at least as profitable as 12 months ones.**

**12, 14, 16,18 ?**

# 1 calf every 18 months : a profitable solution for compact calving systems ?

- **Technicaly possible with current Holstein cows (experiment now on with Normande ones)**
  - **No positive impact on health or fertility but increases cows longevity**

- **Economically profitable**

- **Still many questions about cows getting older : leads to older herd, where is the acceptable limit ?**

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BEST BEFORE
**?**
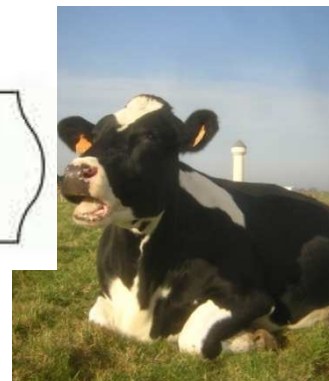
# Extended lactations : prospects

- **Increase selection on persistency**
- **Impacts on meat (calves) and milk industries to assess.**
- **Combine at farm level different calving seasons and lactations durations : which consequences on work organisation ?**

**For the individual farm : 2 calving seasons possible**

- **Keep positive aspects of compact calvings**
- **Give a second chance to cows**
- **Keep age at 1st calving at 24m**
- **Flatten curve of milk deliveries to dairy company**

# New experiments in Trevarez

⊙ = calvings

- ▶ **All the cows on 18 m calving intervals**

|  | Aut '11 | Spr '12 | Aut '12 | Spr '13 | Aut '13 | Spr '14 | Aut '14 | Spr '15 | Aut '15 |
|---|---|---|---|---|---|---|---|---|---|
| **G1** | ⊙ | | | ⊙ | | | ⊙ | | |
| **G2** | | ⊙ | | | ⊙ | | | ⊙ | |
| **G3** | | | ⊙ | | | ⊙ | | | ⊙ |

- ▶ **3 groups calving with 6 months of delay**

- ▶ **Keep more cows, flatten production curve :**

**Flexibility and regularity !**

1 cow group1    Average 3 groups

Lowest month : 6.9% of yearly prod
Highest month : 9.7% of yearly prod
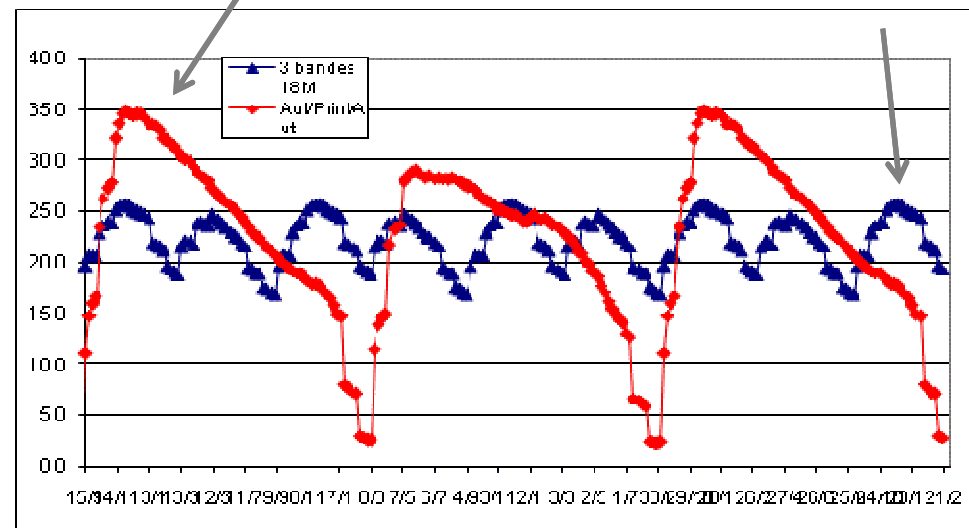
# Thank you for your attention

- **valerie.brocard@idele.fr**

- **French Livestock Institute**

# Reproduction: traitements statistiques

● **Modèles statistiques : régressions log / survie…**

Nombre total d'IA par vache

Réussite IA 1

Réussite IA 1 + IA 2

Vaches inséminées dans les 3 semaines

Intervalle début IA-IAF

Gestation finie

Vue en chaleurs avant début IA

= Lot + Profil de parité + Répétition+ Traitements hormonaux + Covariable lactation « problèmes autour du vêlage » + Lot*Profil + Lot*Traitement + Lot*Covariable lactation

▪ Analyses des taux de survie

# Health troubles: traitements statistiques

- **Modèles statistiques : régressions log, …**

Mammites

Boiteries

Reproduction

Alimentation

Subclinique+prévention+divers

Total sanitaire

Total des interventions

= Lot + Profil de parité + Répétition + Covariable « problèmes autour du vêlage » + Lot*Profil + Lot*Covariable

*En bleu : variables transformées en binaire*