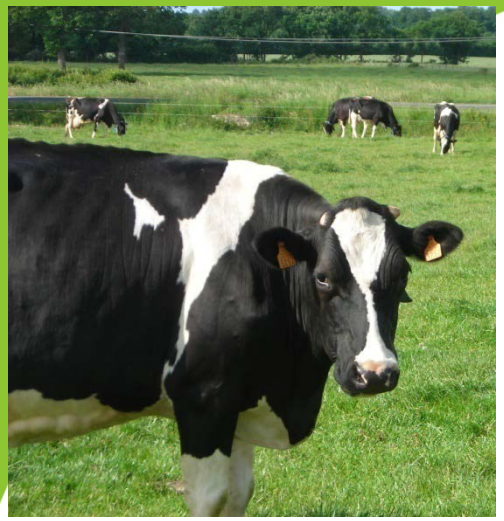

COMBINING ROBOTIC MILKING AND GRAZING

4 years of experiments in Derval experimental farm

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Liberté • Égalité • Fraternité
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One goal

Assure decent :

- Traffic
- Production
- Feed intake

with a

- 100% grass diet
- Saturated robot
- Reasonnable workload

How to combine grazing and a robot ?

- Saturation of the robot
  - 741,000 liters delivered each year
  - 72 Holstein in lactation all year long
  - 9,000 kg of milk as a herd average
  - AMS : Reversed circulation with pre-screening

Choices made at Derval farm

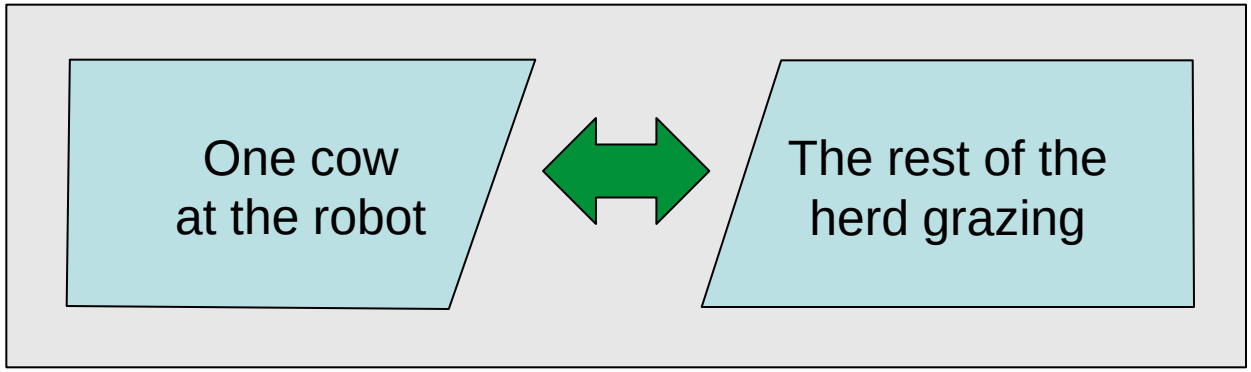
- Simplified rotational grazing
  - 0.40 hectare per cow
  - Perennial Ryegrass + white clover
  - 400 meters to access the furthest paddock
  - Three paddocks
  - No water outside

Choices made at Derval farm

- Buffer feed : maize silage, according to sward volume outside
  - platemeter
  - density
- Target to keep 10 days of grass ahead
- Regular timetable with one fetching of the cows by herdsman

One idea :

- Ideally,

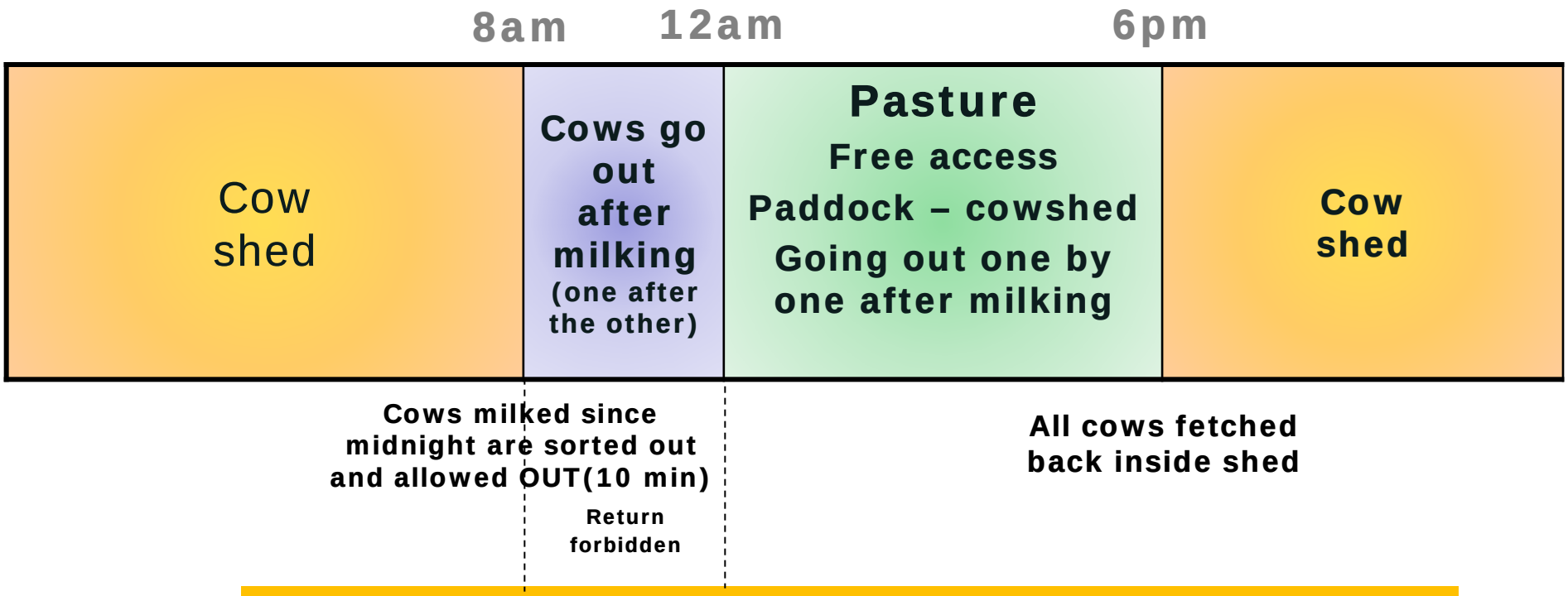


- But difficulties

– Ensure milkings at night
– Compose with cows' gregarious instinct
– Act individually or collectively

From 100% maïs silage down to 8 kg DM :

One situation, one organisation



- 2 daily compulsory working periods: 8am and 6pm
- Sure to have milkings till 12am
- Returns from 12am and 6pm according to weather

100 % grazing

One situation, one organisation

8am		6pm	9pm
Pasture **Going out one by one after milking**	**Pasture** **Free access** **Paddock – cowshed**	**Cow shed**	**Pasture** **Going out one by one after milking**
Cowshed open		**Cows fetched back and pushed inside shed**	

- 1 daily compulsory working period at 5:30pm - 6pm
- 30 milkings performed between 00am and 6am
- Cows come back between 8am and 6pm according to weather

Many questions

- Is it possible to close the maize clamp ?
- Which factors do affect the milking frequency ?
- What is the impact of grazing on feeding cost with robotic milking system ?

Data registred and analysed

- Technical criteria:
  - All forage delivered and concentrate are weighed
  - Measures of grass height and density ; estimation of grazed grass intake (Inra, 2007 : intake capacity)
  - Dairy production (cow and tank levels)
  - Milking frequency

- Economic criteria
  - Feeding cost
  - Margin over feeding cost

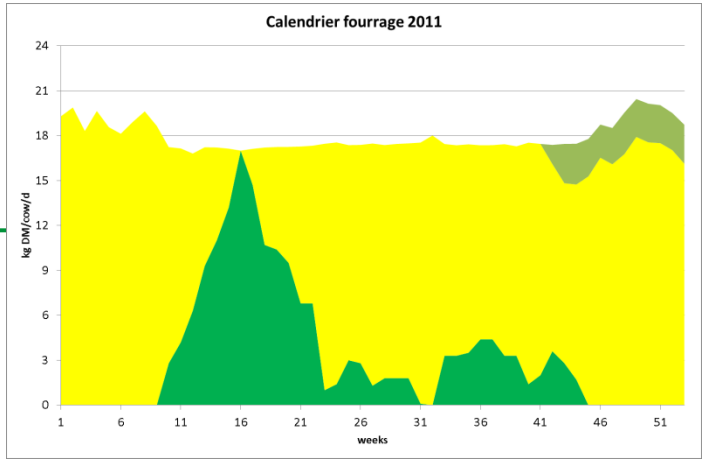
Statistical Analyses

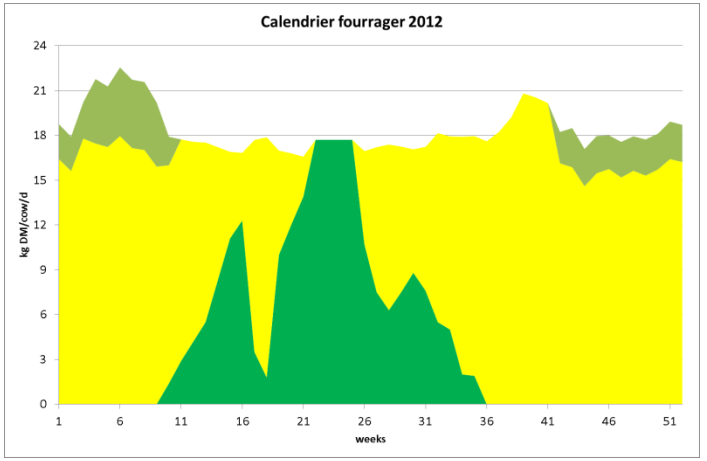
- Test of effects of feeding periods (P) on production criteria and frequency over 3 years :
  - P1 : 100 % maize silage
  - P2 : transition period
  - P3 : 100 % grazing

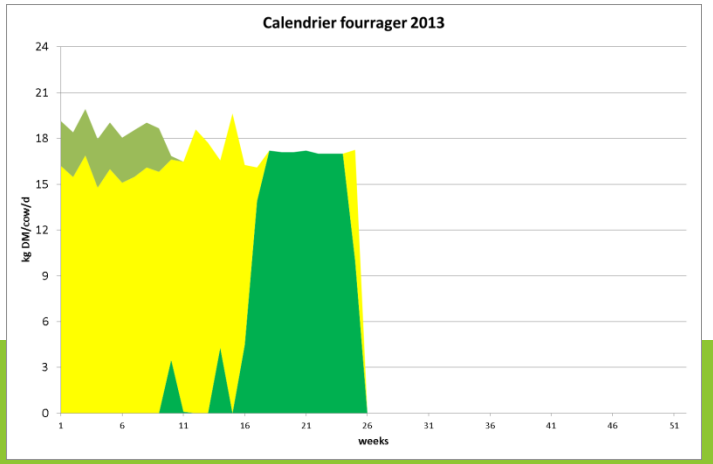
- No significant differences of lactation stages and parity between years and feeding periods

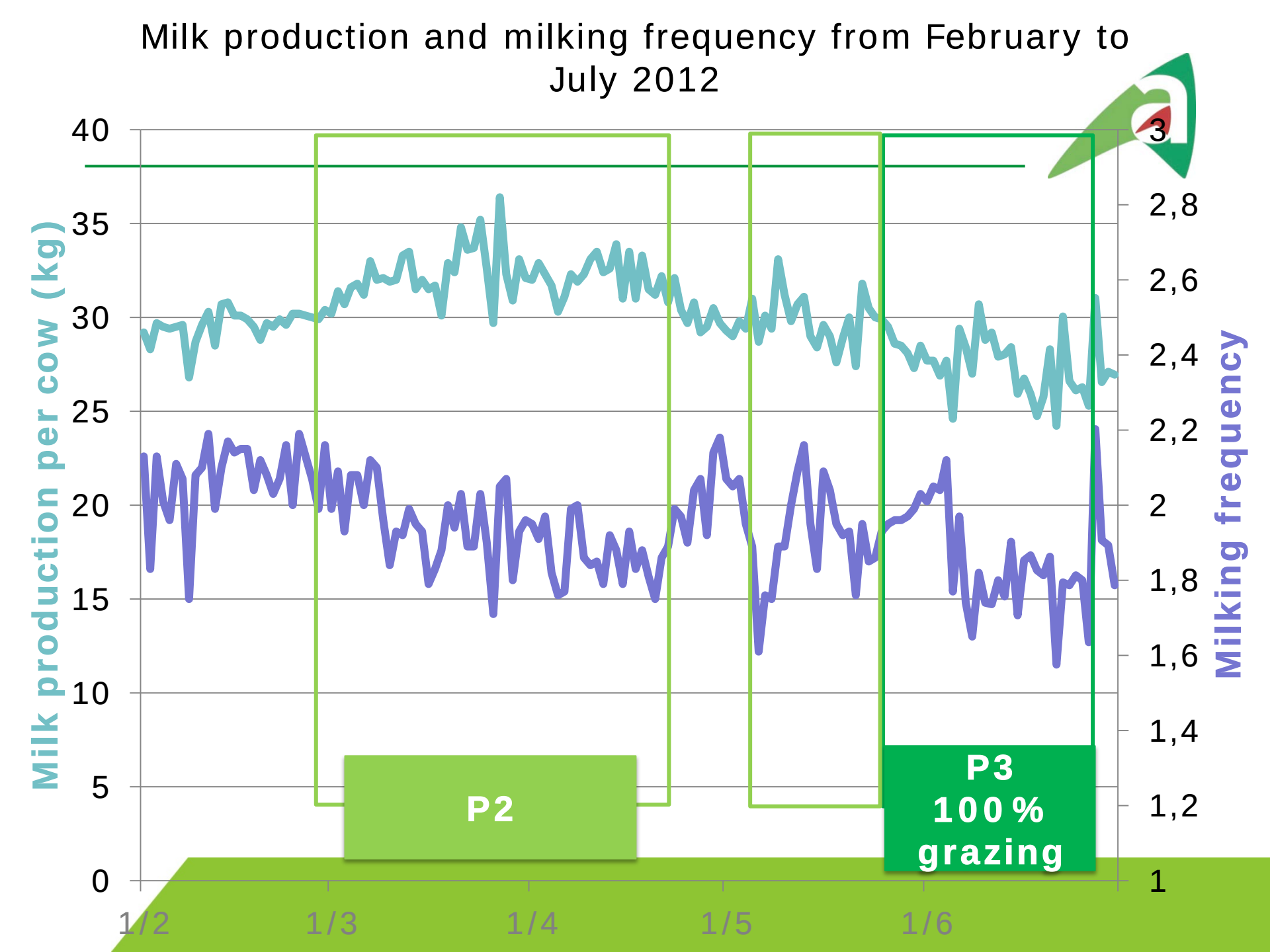
Grass intake

	2011	2012	2013 Jan-Jul
Grazing days	220	145	129
100 % grazing (d)	11	32	56
Grazed grass ($kgDMc\text{-}^{1}\ d^{-1}$)	1,200	1,500	1,100








Milk production and milking frequency from February to July 2012
Milk production per cow (kg)
Milking frequency
40
35
30
25
20
15
10
5
0
3
2,8
2,6
2,4
2,2
2
1,8
1,6
1,4
1,2
1
1/2
1/3
1/4
1/5
1/6
P2
P3
100 %
grazing

Effect of period on milk production

- Milk production
  - Significant difference between periods
  - P1 > P2 > P3 (<0,0001)

- Effect partial grazing P2-P1 : +1,4 kg of milk.c^{-1}.d^{-1}
  - Decrease by -1,7 kg concentrate.c^{-1}.d^{-1}

- Effect **100% grazing** P3-P1 : **-1,7 kg of milk.c^{-1}.d^{-1}**
  - Decrease by -2 kg concentrate.c^{-1}.d^{-1}

- Estimate production :
  - P1 : 28,9 kg of milk.c^{-1}.d^{-1}
  - P2 : 30,3 kg of milk.c^{-1}.d^{-1}
  - P3 : 27,5 kg of milk.c^{-1}.d^{-1}

Effect of period on milking frequency

- Milking frequency
  - Significant difference between periods
  - P1 > P3 >P2 (<0,0001)

- Effect partial grazing P2-P1 : -0,15 milking.c^{-1}.d^{-1}

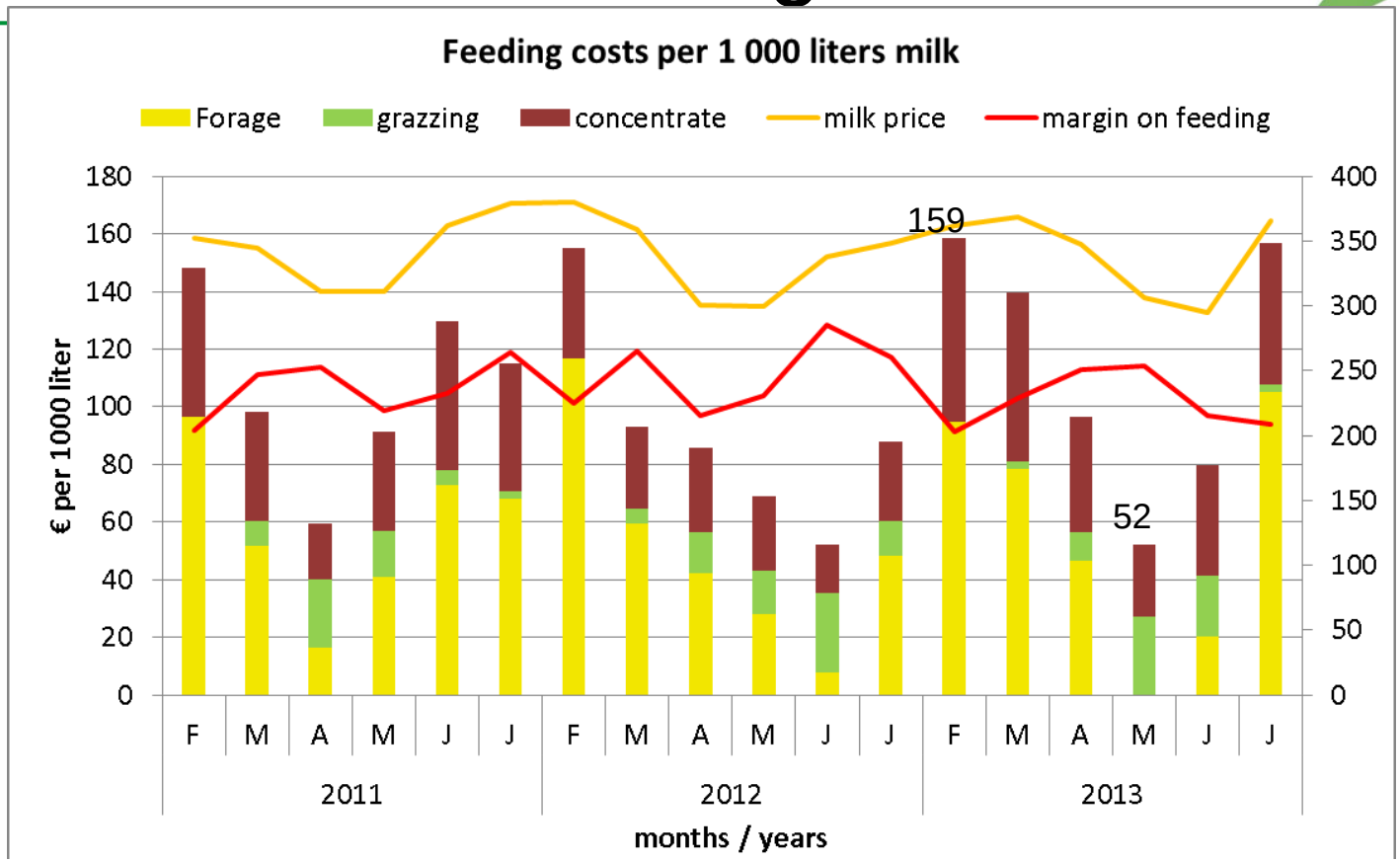
- Effect **100% grazing** P3-P1 : **-0,12 milking.c^{-1}.d^{-1}**

- Estimate production :
  - P1 : 2,11 milking.c^{-1}.d^{-1}
  - P2 : 1,96 milking.c^{-1}.d^{-1}
  - P3 : 1,99 milking.c^{-1}.d^{-1}

Performance of AMS in 2012

	P1(60j)	P2(74d)	P3(32d)
Headcount	73	74	74
Number of milkings per d	149	141	138
AMS Production (kg per d)	2130	2323	2044

Reduction of feeding costs



- -30% feeding cost with 100% grazing compared to 100% indoor
- margin on feeding cost between 200 and 300 € per 1000 liters

Combining robotic milking and grazing is possible !

- 1,200 kg of grazed grass per cow in 2012
  And already…1,100 kg in 2013!

- Maize clamp closed during 7 weeks in 2013

- Efficient cow traffic in 100% grazing
  - Frequency : 1,99 milking.c^{-1}.d^{-1}
  - Production : 27,5 kg of milk.c^{-1}.d^{-1}

Combining robotic milking and grazing is possible !

- Limited work load
  - Once per day fetching of the cows by herdsman
  - No silage distribution
  - Less cubicle cleaning

Thank you for your attention

You can visit Derval experimental farm this Friday to discover the equipement

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