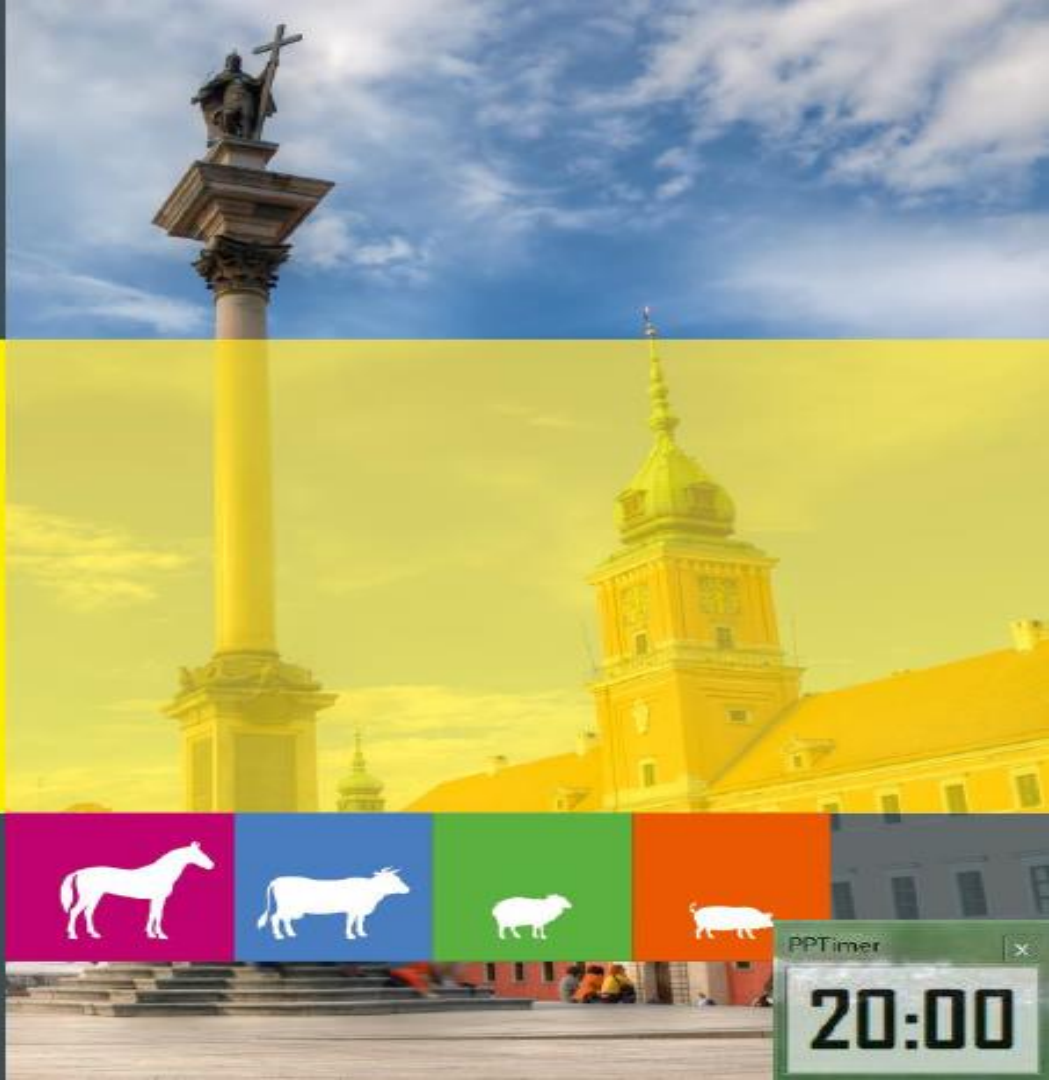


66th
EAAP
ANNUAL MEETING



INNOVATION IN LIVESTOCK PRODUCTION: FROM IDEAS TO PRACTICE

31 AUGUST - 4 SEPTEMBER 2015
WARSAW, POLAND



PPTimer

20:00

Differences between cloned and non-cloned cows during the first lactation

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Introduction

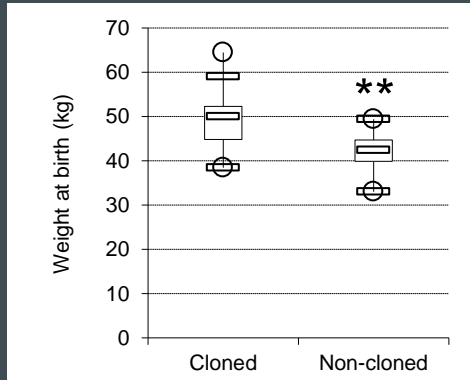
- The high variability in bovine milk production depends both on genetic and environmental factors
- Whereas genomic selection has contributed to largely improve milk production, mechanisms underlying the influence of the environment are mostly unknown
- They can be studied using cloned cows (obtained through nuclear transfer), presumed to have identical genomes



Experimental procedures

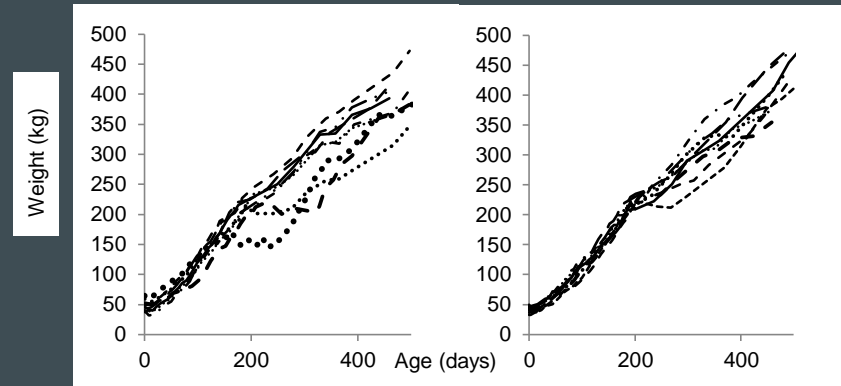
Prim'Holstein cows:
Cloned cows (n=9) and non cloned cows (n=9)

- Produced at similar period of the year



Differences in weight at birth ** $p=0.015$

- Raised in similar conditions



Cloned cows

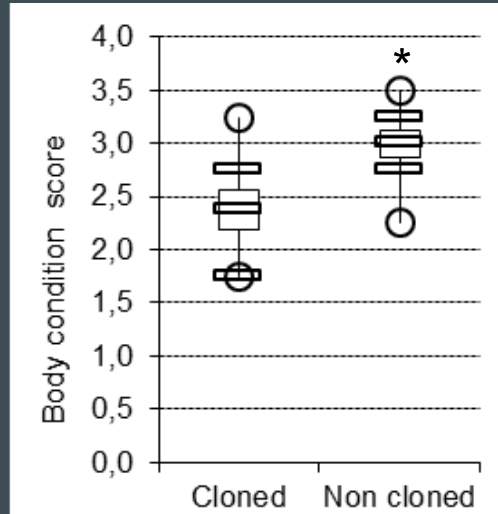
Non-cloned cows

Differences in slopes of curves ($p=0.0003$)



Reproduction

- All cows were inseminated at the age of 1.5 year
 - Eight cloned and 7 non-cloned cows delivered
- Body condition score at calving was lower (Δ BSC= -0.6) for cloned cows

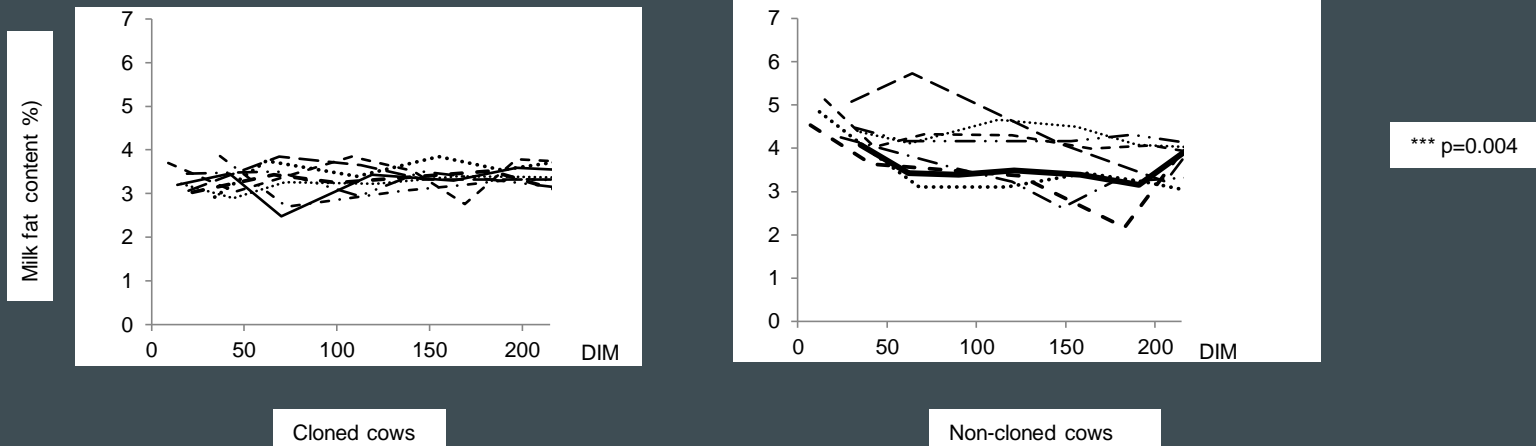


* p=0.035



Milk production during 200 DIM

- Milk yield was highly variable among animals but similar between the 2 groups
 - Milk protein and fat contents were less variable in cloned cows

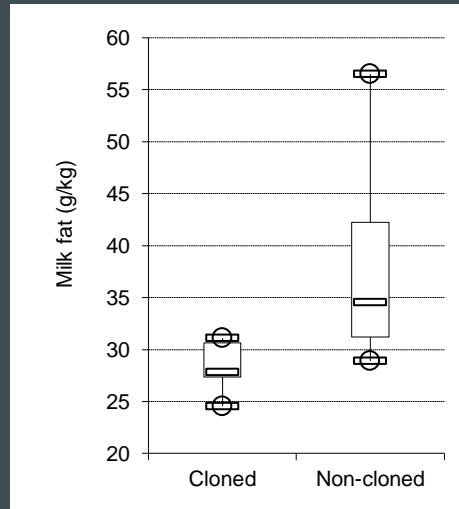


Milk composition around 67 DIM

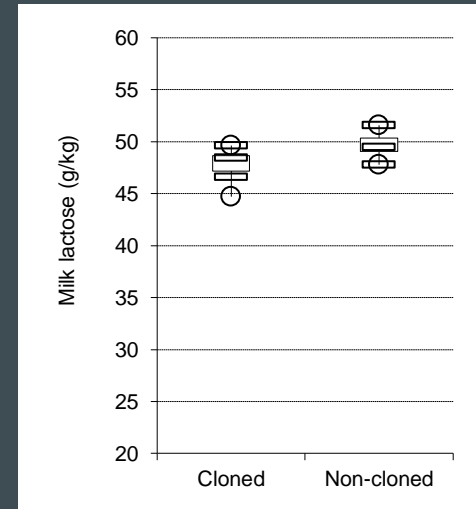
- Lower protein, fat and lactose contents were observed in cloned cows



* p=0.04



** p=0.01

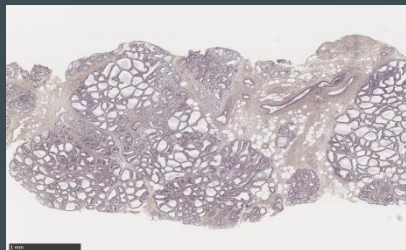


* p=0.02

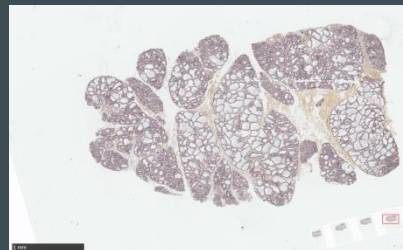


Mammary biopsy analyses

- Around 67 DIM, biopsies were collected from a rear quarter of the udder
- Five biopsies in each group contained more than 60% of mammary epithelial tissue



Cloned cow



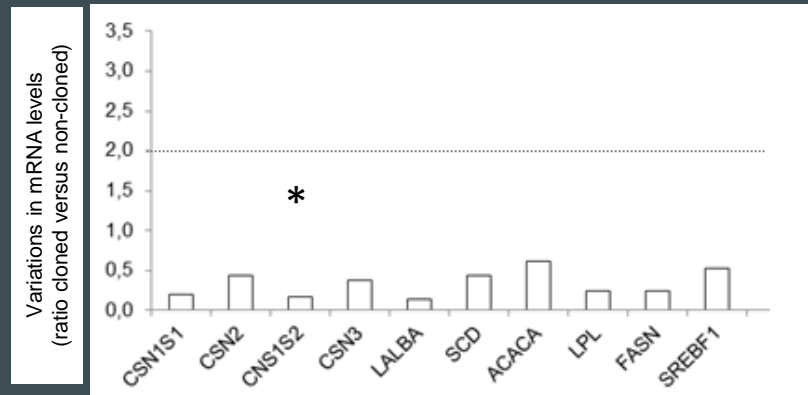
Non-cloned cow

- They were from a sub-selection of cows which had a milk production representative of that observed among cows in each group.



RNA and milk synthesis

Levels of transcripts involved in most casein, fat or lactose syntheses were highly variable and in the average lower in cloned cows but not different between cloned and non-cloned cows, (except CSN1S2)

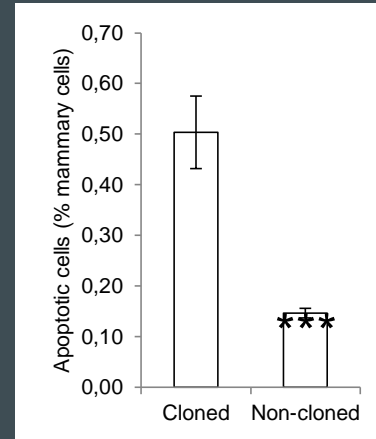


* p=0.05



Milk somatic cell counts (SCC) in cloned cows

- Higher milk SCC, as an average ($p=0.1$)
- Higher apoptotic rate (TUNEL)
- Increased frequency of high SCC ($p=0.09$)



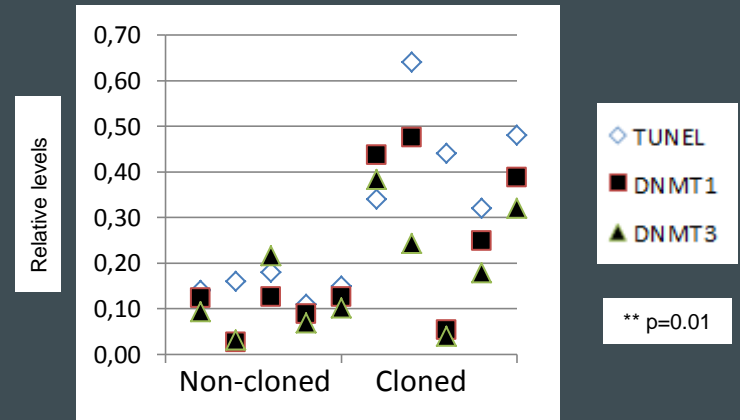
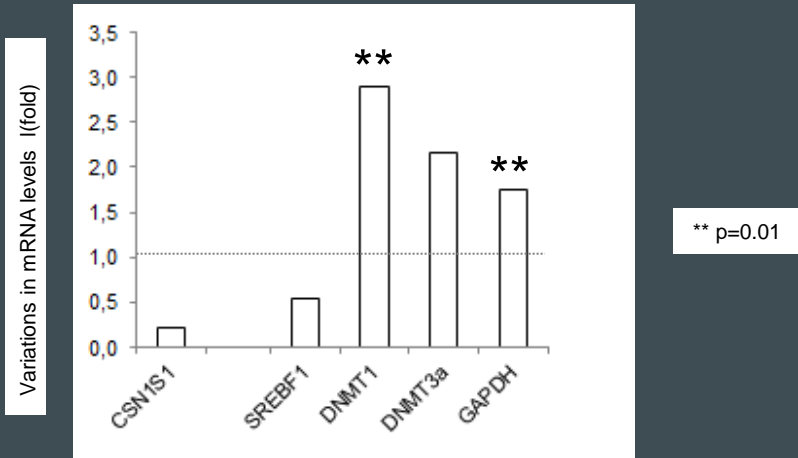
During lactation, a slow renewal of mammary cells is observed (0,3% per 24h)
Mammary specific DNA methylation profiles are likely to be maintained by DNMT1



DNA methylation- *DNMT1* mRNA

DNMT1 RNA levels were higher (p=0.05) in cloned cows

DNMT1 RNA levels were related to the apoptotic rates (TUNEL)



Conclusions

- Lactation and milk production in cloned cows exhibit slight differences as compared to those of non-cloned cows
 - Higher somatic cell counts, higher apoptotic rates in relation with modifications of global DNA methylation profiles may explain such differences





Thank you for your attention ! Acknowledgements

Collaborators:

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- M. Boutinaud, INRA UMR 1348, PEGASE
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