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Effect of dry period length on culling and pregnancy in the subsequent lactation of Holstein dairy cattle

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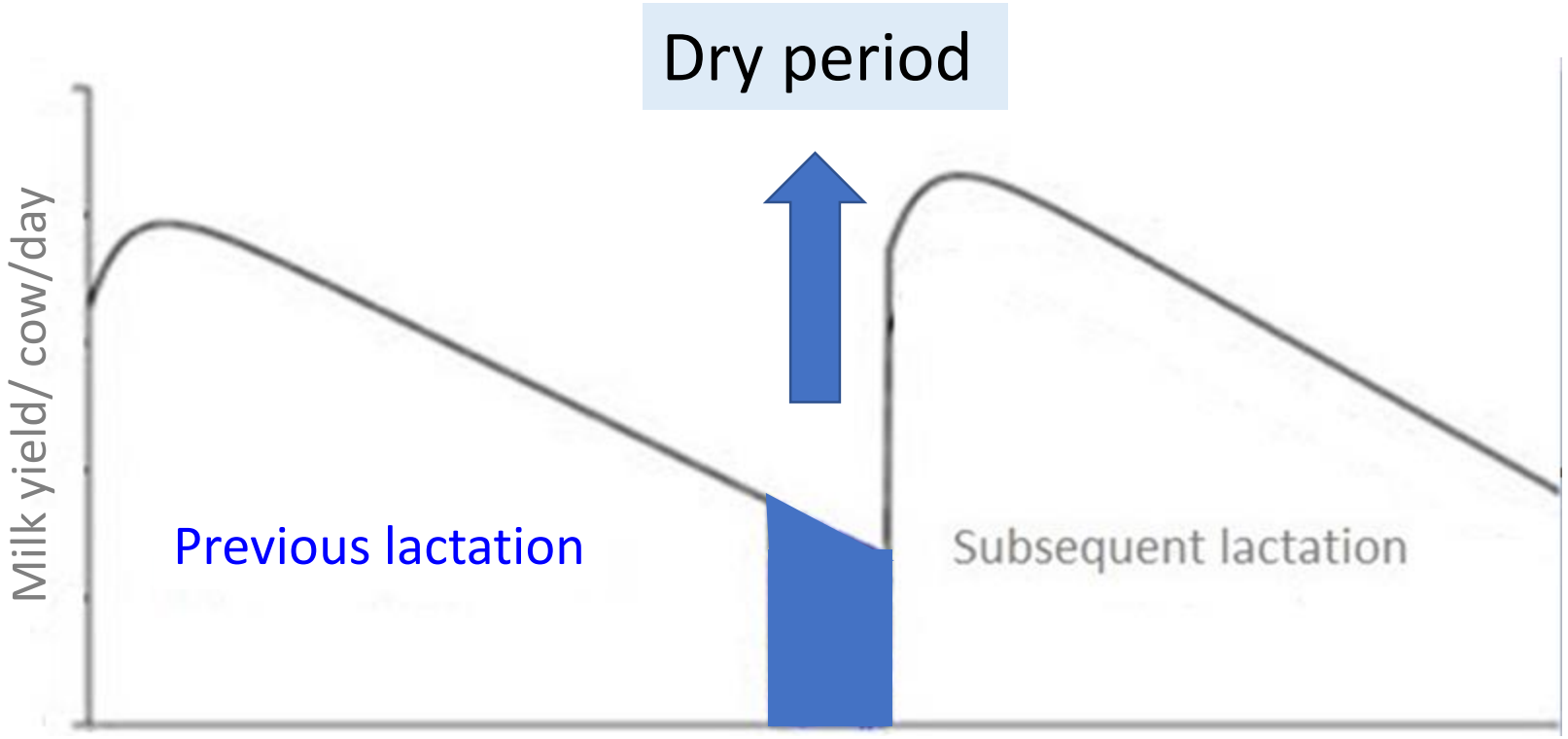
Overall goal: Economic optimization of dry period length



Cow performance in the subsequent lactation

- Milk yield
- Milk composition
- Health
- Fertility
- Calf performance
- Culling
- **Economics?**

Preliminary study

Economic optimization of dry period length under 4 farm constraints

Milking time/day

Milkings/day

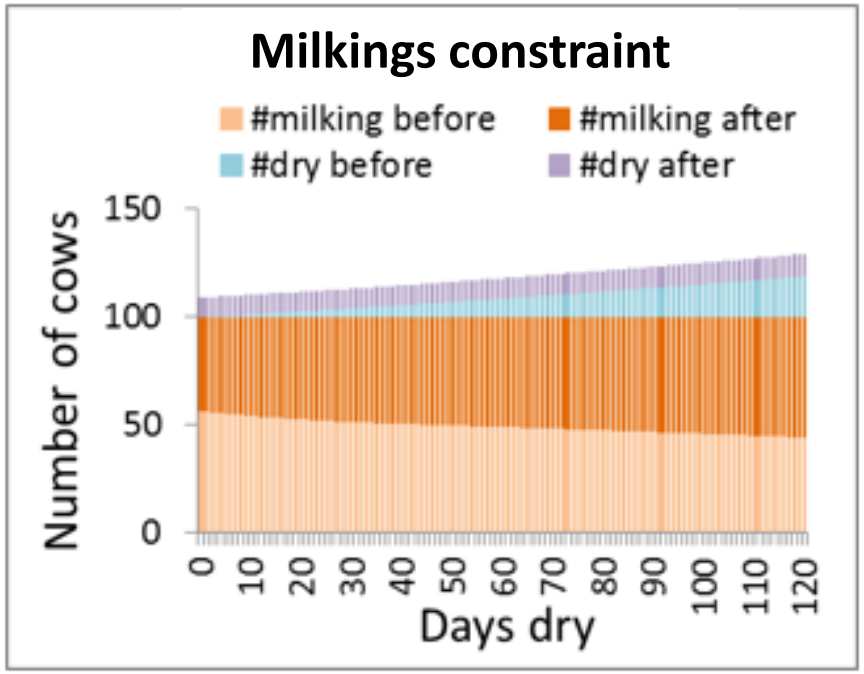
Farm constraints

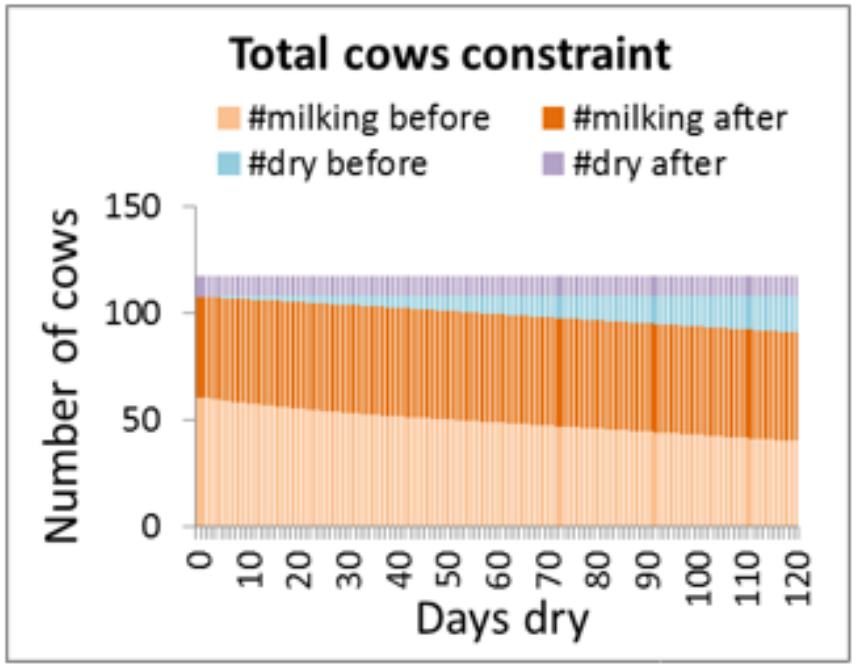
Total cows = milking + dry

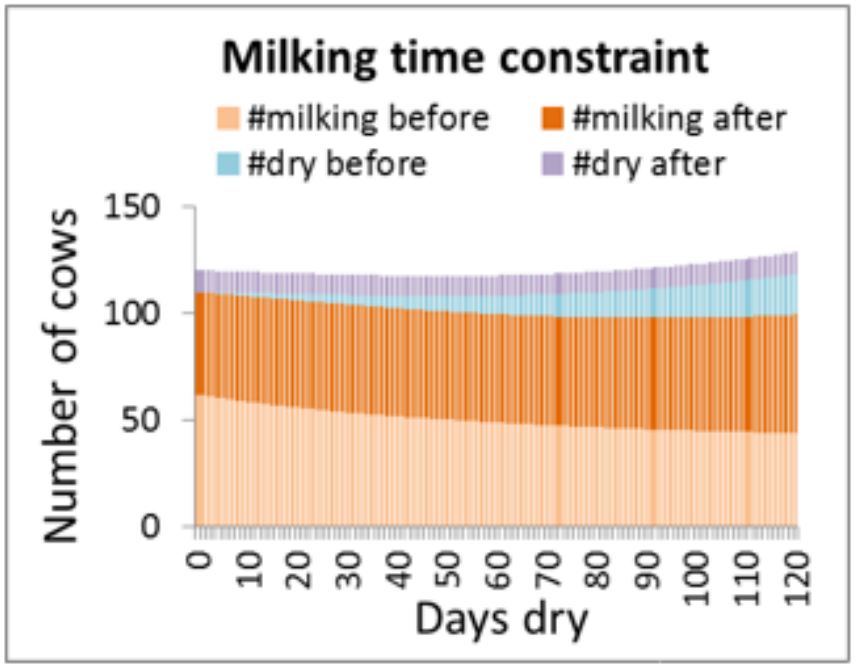
Milk quota

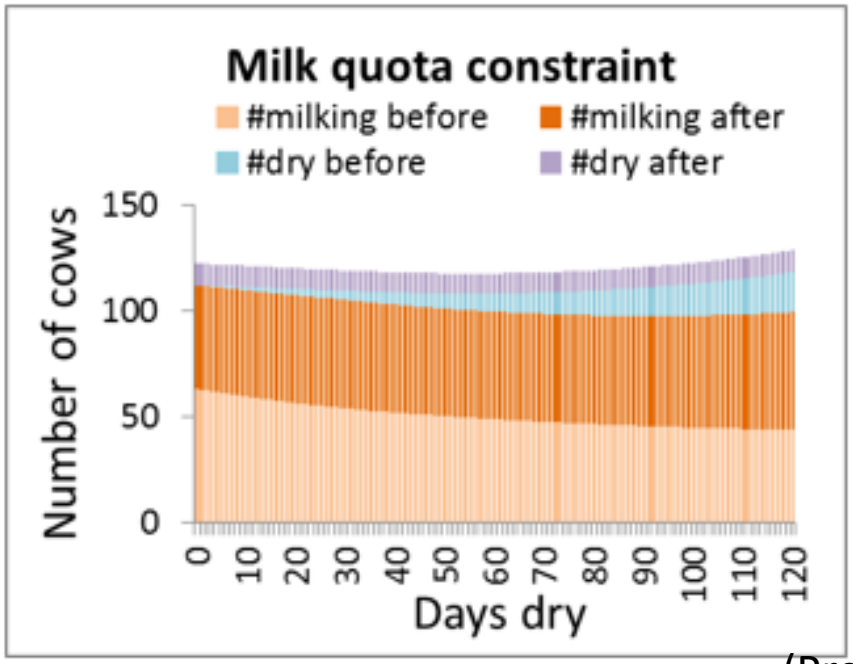
Spreadsheet model

- Milk lactation curves
- Milking time as a function of milk yield
- Dry matter intake as a function of milk yield, body weight, days in milk
- Prices
- Effect of dry period length on:
  - Milk yield in the subsequent lactation
  - Days to pregnancy in the subsequent lactation
- Objective: maximize herd milk sales minus feed cost
  - Previous + subsequent lactation



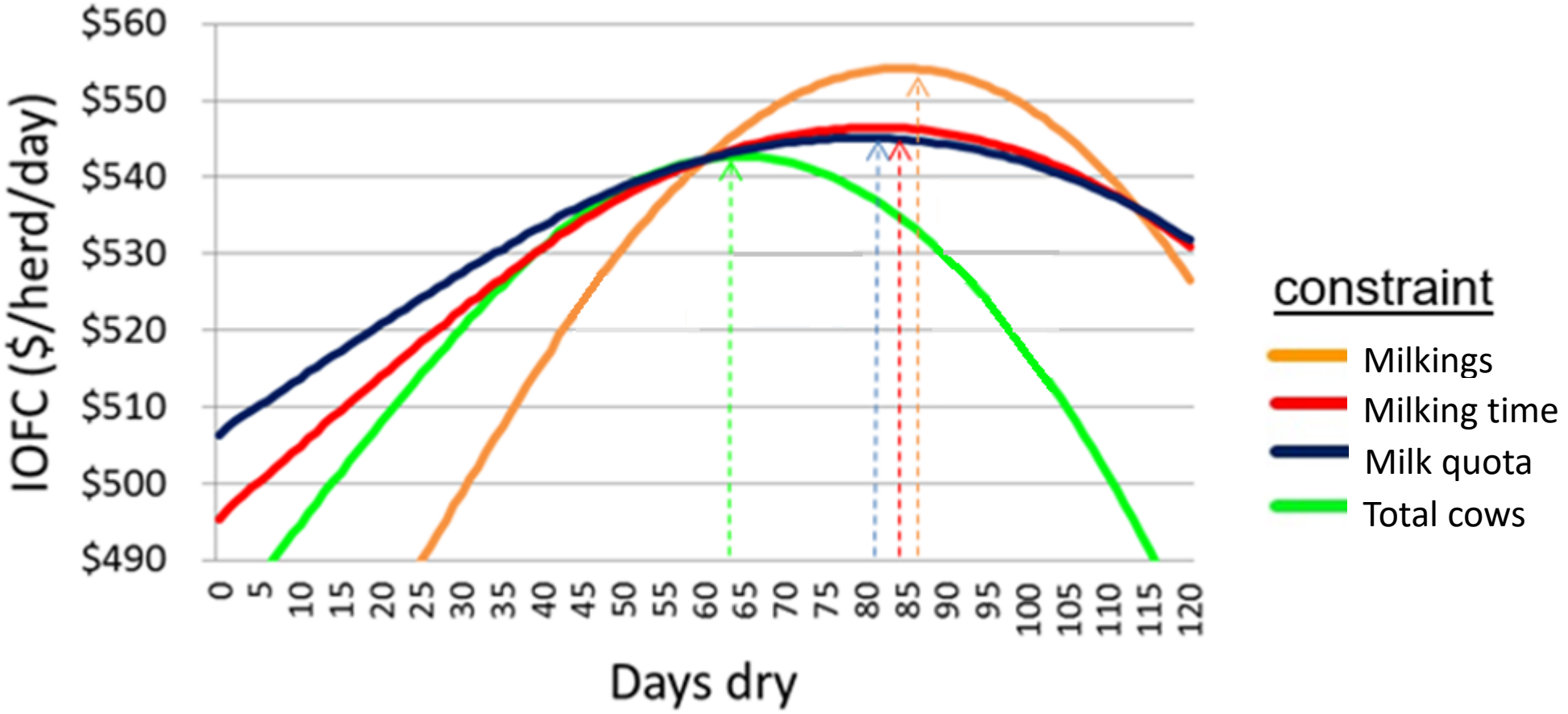






(Preliminary results)

Herd milk sales - feed cost (IOFC)



(Preliminary results)

Limitations

- Simple effect of dry period length on days to conception
- No effect of dry period length on survival

The objective

To quantify the effect of **dry period length** on **culling** and **pregnancy risk** in the subsequent lactation

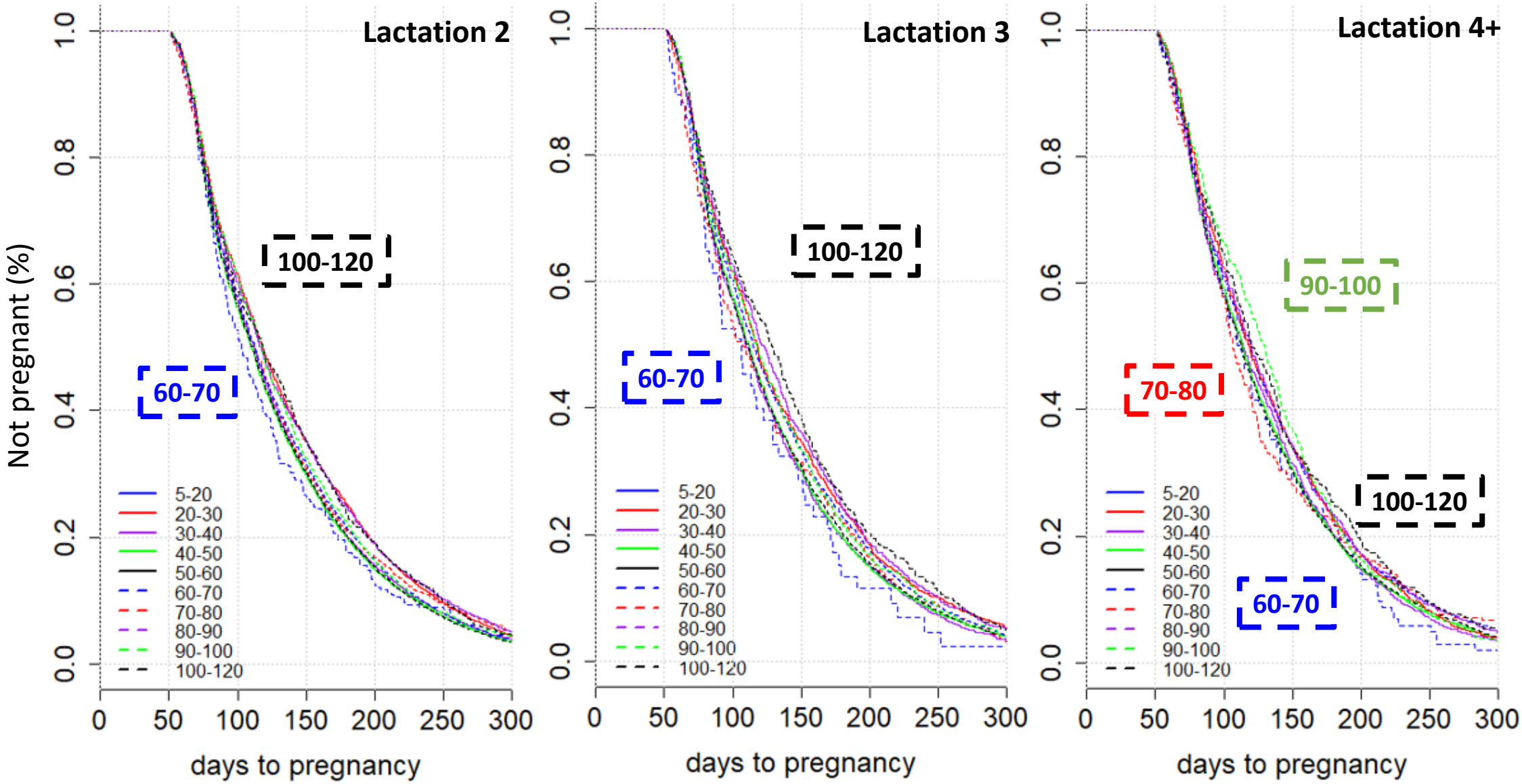
Data description and editing

- Monthly milk test (DHIA) lactation records from DRMS, NC, USA
- Cows had their last day dry in 2014 or 2015 and completed the previous lactation
- Each cow had at least 6 milk test observations in the previous lactation
- Dry period lengths were from 5 to 120 days (average = 58 days), classified into 10 or 14 categories
- After editing, n = 388,492 Holsteins in 4,661 herds in 42 states
- 3 groups: lactation 1→2, lactation 2→3, lactation 3+→4+

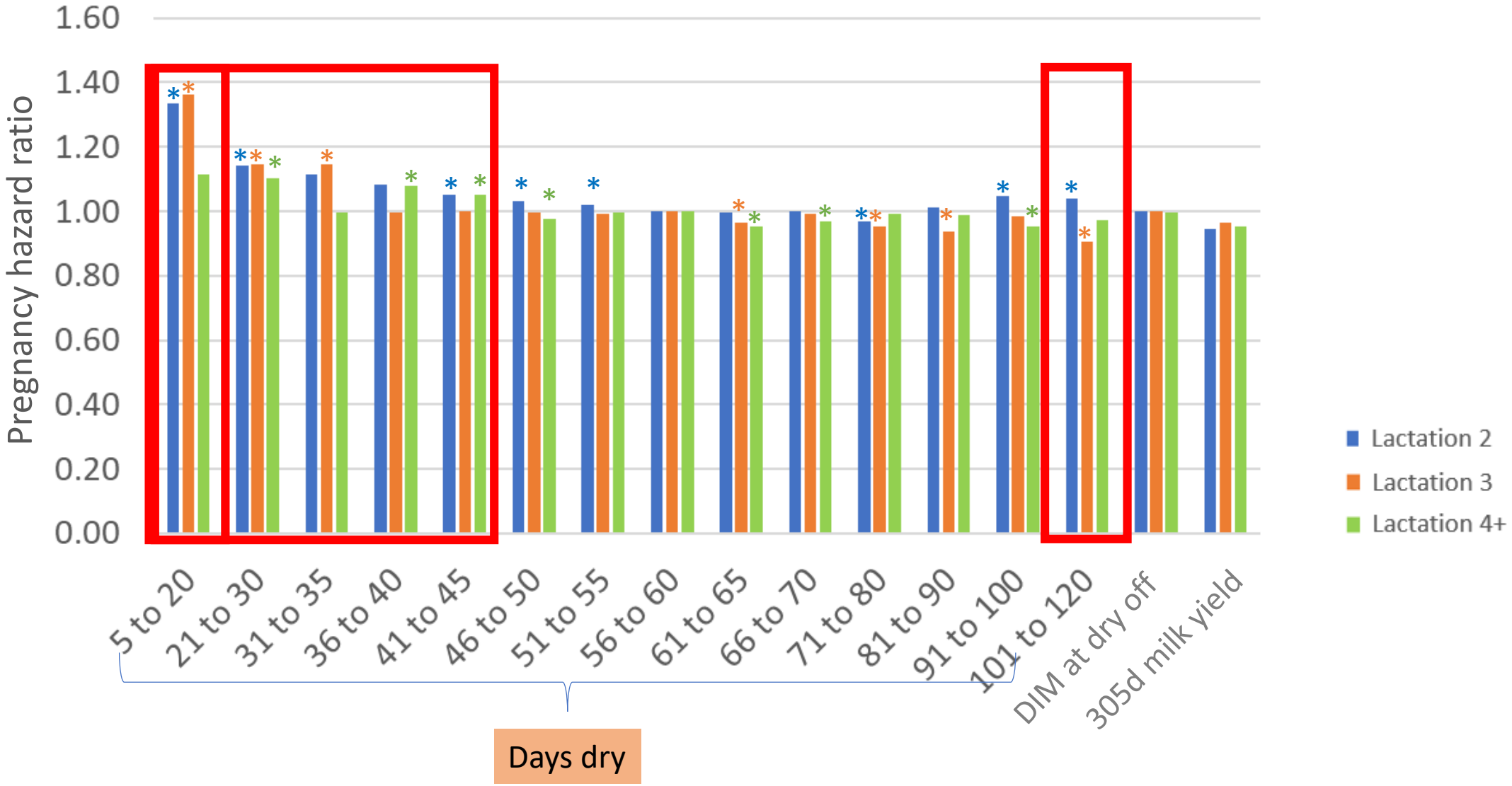
Materials and methods: Survival analysis

- Time and censoring
  - Days to pregnancy (censored at: 300 DIM, left the herd)
  - Days to culling (censored at: 500 DIM, sold for dairy, next calving)
- Kaplan-Meier survival analysis
- Cox proportional hazards model (with time-dependent variable of pregnancy status for culling)

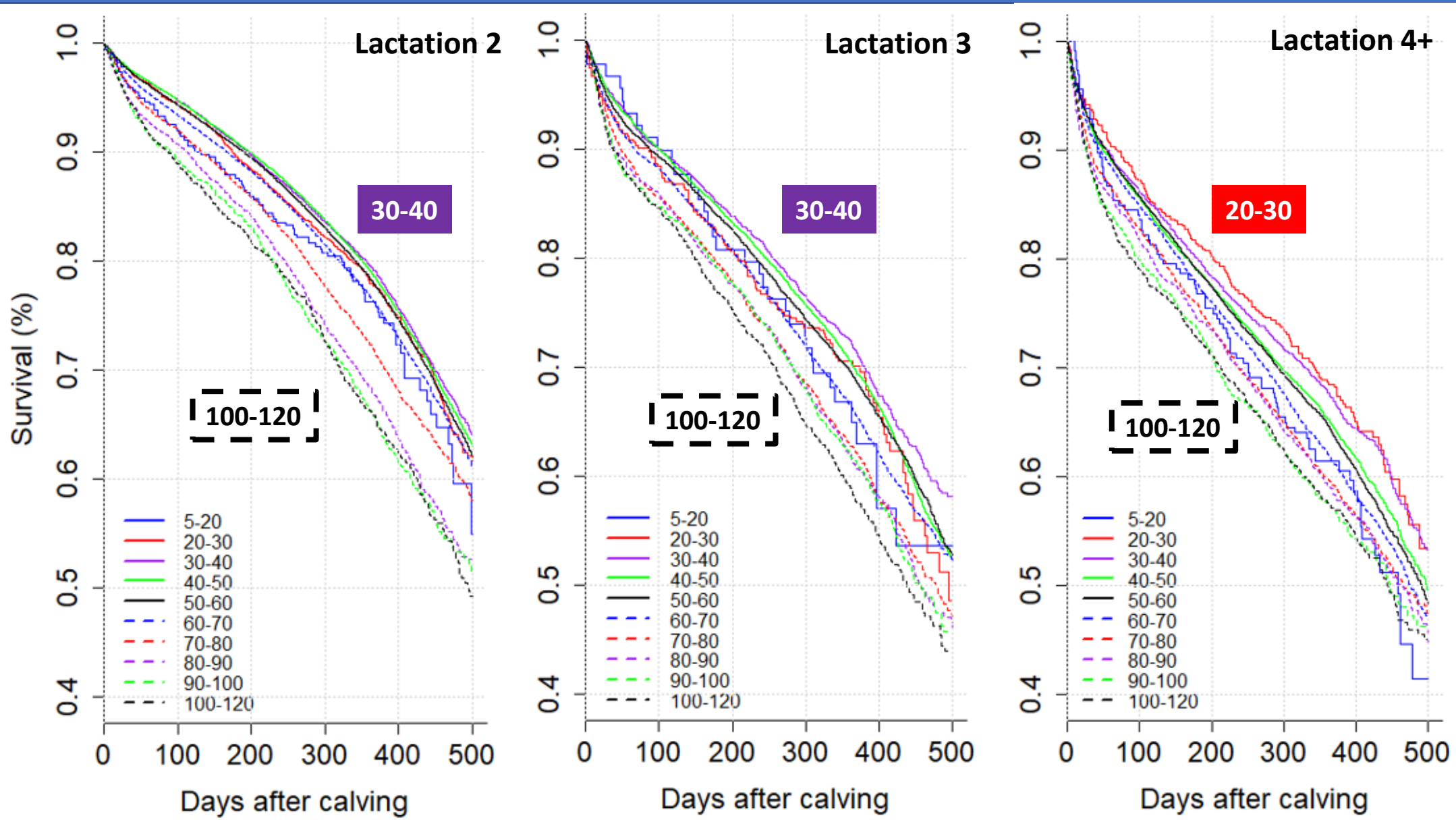
Kaplan-Meier survival curves: Pregnancy



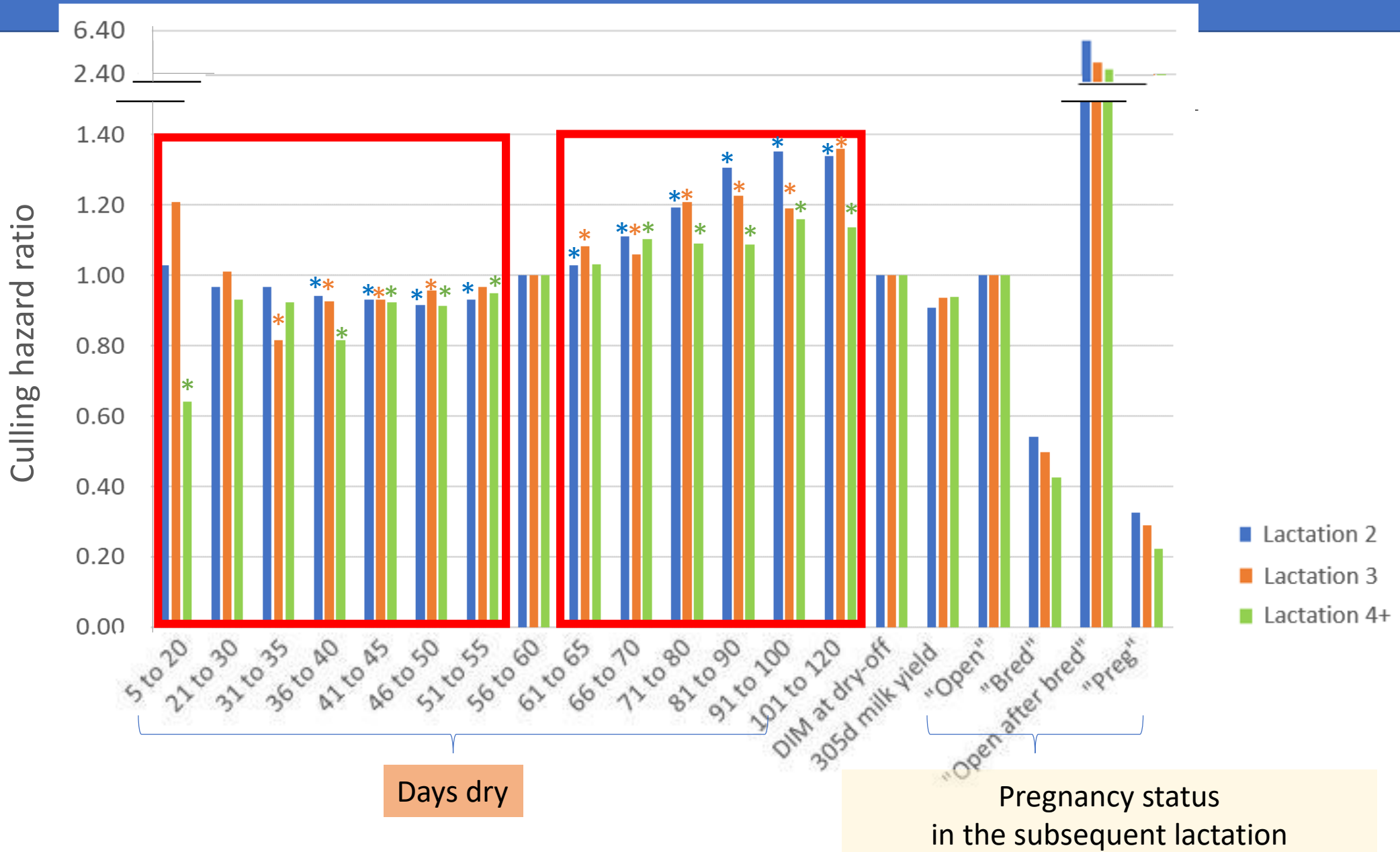
Cox hazard models: Pregnancy



Kaplan-Meier survival curves: Culling



Cox hazard models: Culling



Conclusions

- Risk of pregnancy was the greatest when the dry period length was lower than 45 days
- Risk of culling increased when the dry period length was greater than 60 days
- Both risk of pregnancy and culling in the subsequent lactation were affected by dry period length and need to be considered when optimizing dry period length of dairy cows