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The effect of conception season on the occurrence of twin pregnancies in Holstein-Friesian cattle – preliminary study

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Twin pregnancies - negative effects on cows and calves:

Retained placenta

Metabolic diseases

Reduced milk yield

Dystocia

Increased calf mortality

Reduced calf birth weight

Freemartinism

Risk factors associated with the occurrence of Multiple Ovulations (MOV):

Physiological

- Cow's age
- Milk yield
- Previous twin pregnancies
- Presence of ovarian cysts

Andreu-Vázquez et al., 2012

Macmillan et al., 2018

López-Gatius et al., 2023

Genetic

- Utility type
- Breed
- Line

Rózewicz, 2016

Libera et al., 2019

Environmental

- Season
- Photoperiod
- Implementation of synchronization programs

Schambow et al., 2021

López-Gatius et al., 2024

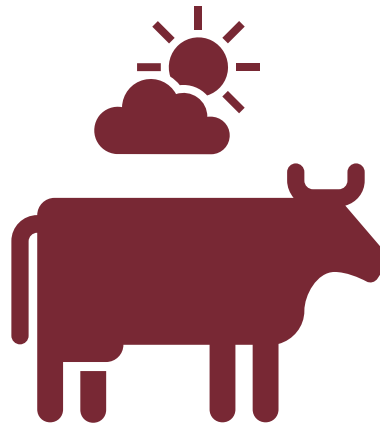
Seasonal factors associated with the occurrence of MOV:

- Risk of twin pregnancy was reduced when AI was performed during the warm season or an increasing photoperiod.
- Conceptions occurring between July and December were associated with a higher likelihood of twin pregnancies.
- Season (warm vs. cool) had no significant effect on multiple ovulation and pregnancy rates. However, ovarian activity in cows appeared to be strongly influenced by photoperiod (day length).

[Andreu-Vázquez et al., 2012; Schambow et al., 2021; López-Gatius et al., 2024]

Aim of the study

Analysis of the effect of conception season
on the incidence of twin pregnancies
in Polish Holstein-Friesian cattle



Material and methods

Data Collection Sources (2016–2024)

- Barn notebooks
- Cow and heifer cards
- DeLaval DelPro Management Program
- Insemination certificates

Animals

- Polish Holstein-Friesian cattle
- Mixed housing system
- TMR feeding system
- Artificial insemination (without synchronization programs)

Methods:

- Data analysis was performed using chi-square test of independence
- The significance level was set at 0.05
- Statistical analysis was conducted using R software

Results – frequency of twin births

Table 1. Frequency of twin births relative to the total number of calvings in years 2016–2024

Year	Total number of calvings	Twin births	
		number	frequency [%]
2016	73	4	5.48%
2017	81	4	4.94%
2018	92	4	4.35%
2019	90	2	2.22%
2020	108	8	7.41%
2021	112	4	3.57%
2022	127	4	3.15%
2023	112	4	3.57%
2024	80	3	3.75%
Total	875	37	average: 4.27%

Seasonal variability in conceptions and multiple pregnancy rates (2016–2024)

Table 2. Variability in the total number of conceptions and the percentage of multiple pregnancies depending on the season in the years 2016–2024

Season	Total number of conceptions	Twin births	
		number	frequency [%]
Winter	263	9	3.42%
Spring	229	10	4.37%
Summer	147	5	3.40% 
Autumn	236	13	5.51% 

p = 0.6512

Monthly trends in cattle conceptions

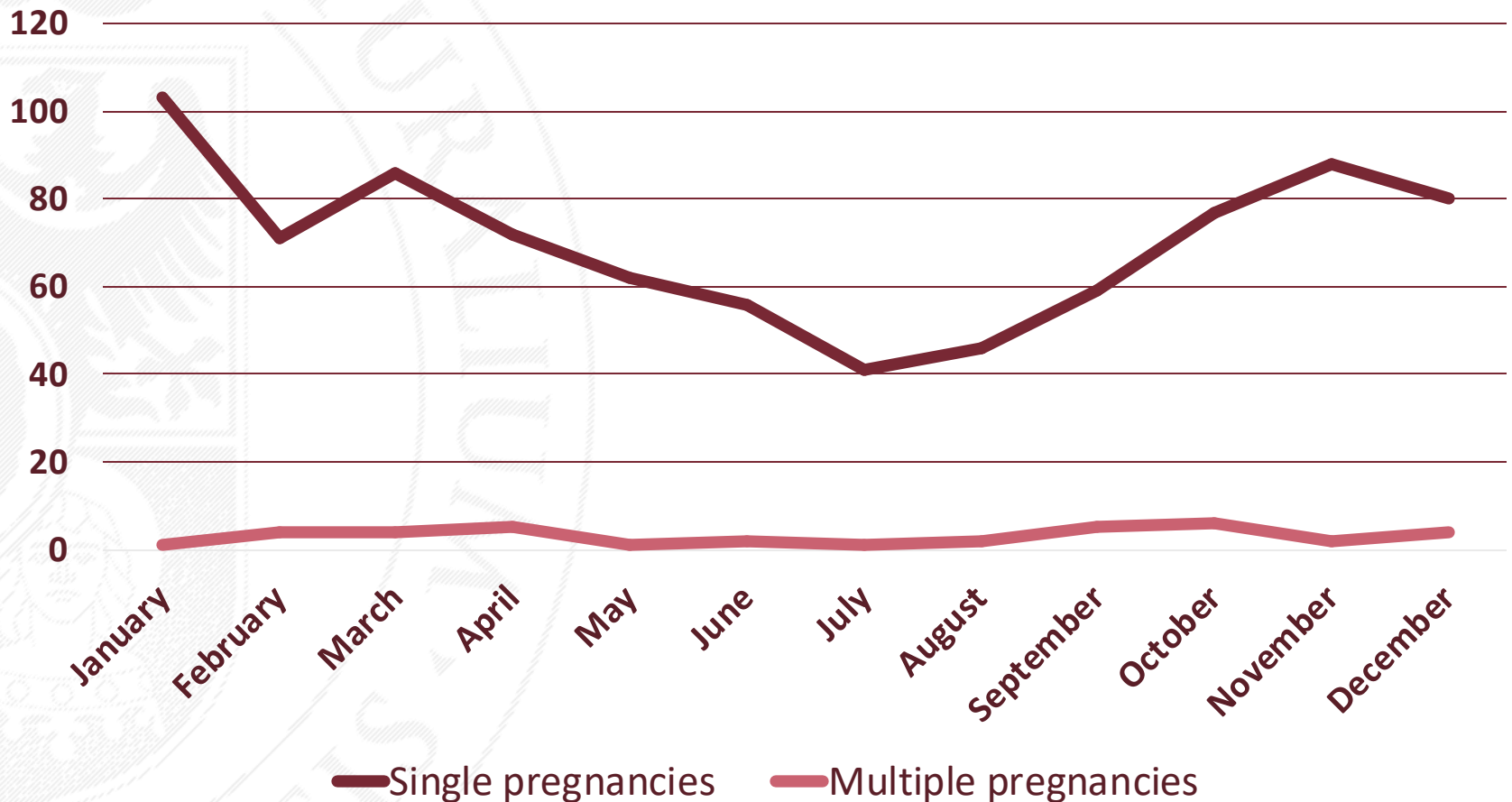


Figure 1. Fluctuations in total number of conceptions in particular months (years 2016-2024)

Monthly trends in cattle conceptions for multiple pregnancies

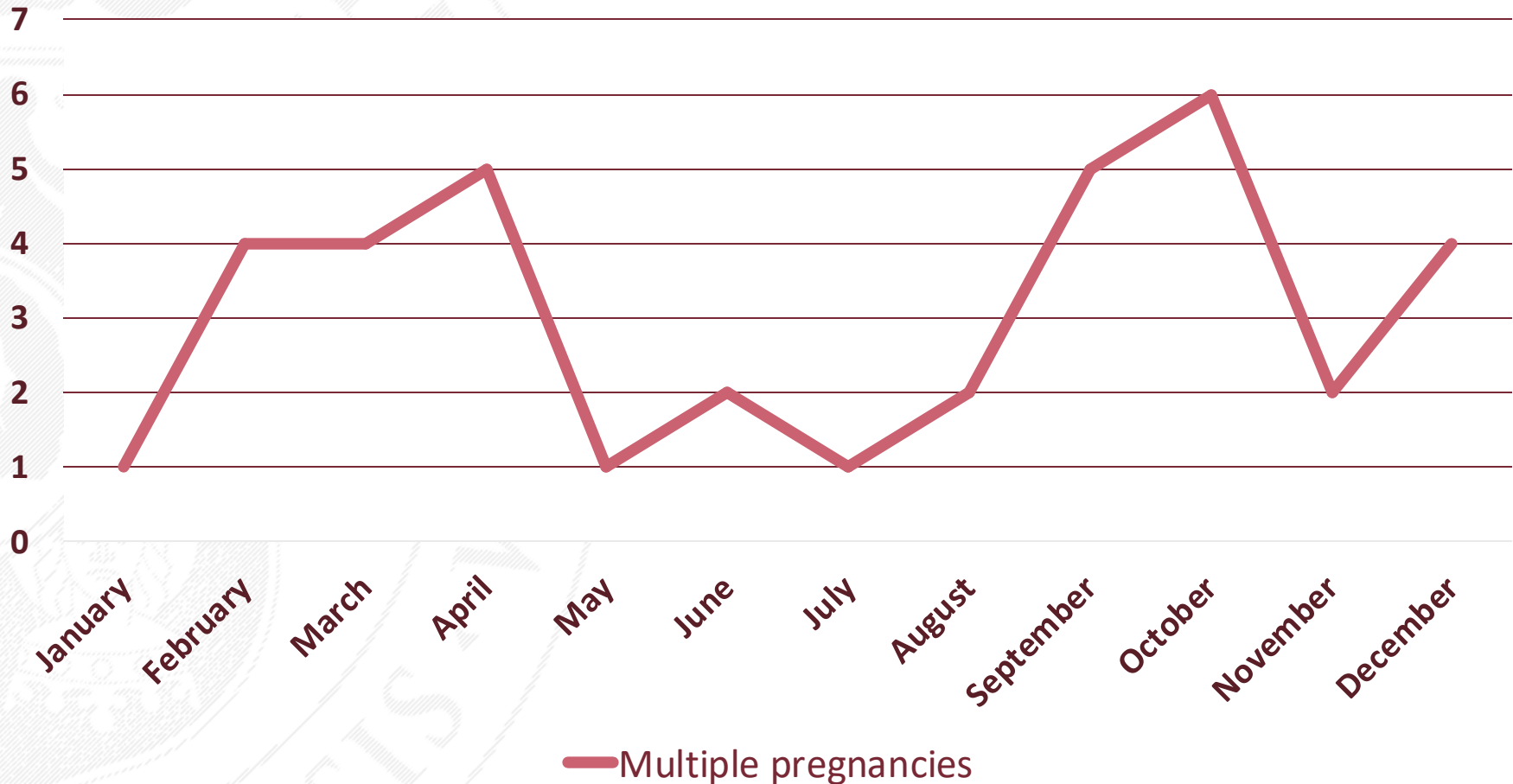


Figure 2. Fluctuations in number of conceptions for multiple pregnancies in particular months (years 2016-2024)

Effect of cow's age on multiple pregnancies

Table 3. Percentage of multiple pregnancies between cows in group I (1st and 2nd lactation) and group II (3rd and subsequent lactations)

	Group I	Group II
Number of conceptions	517	358
Percentage of multiple pregnancies	2.32%	6.98%

p = 0.0014

Effect of cow's age on multiple pregnancies

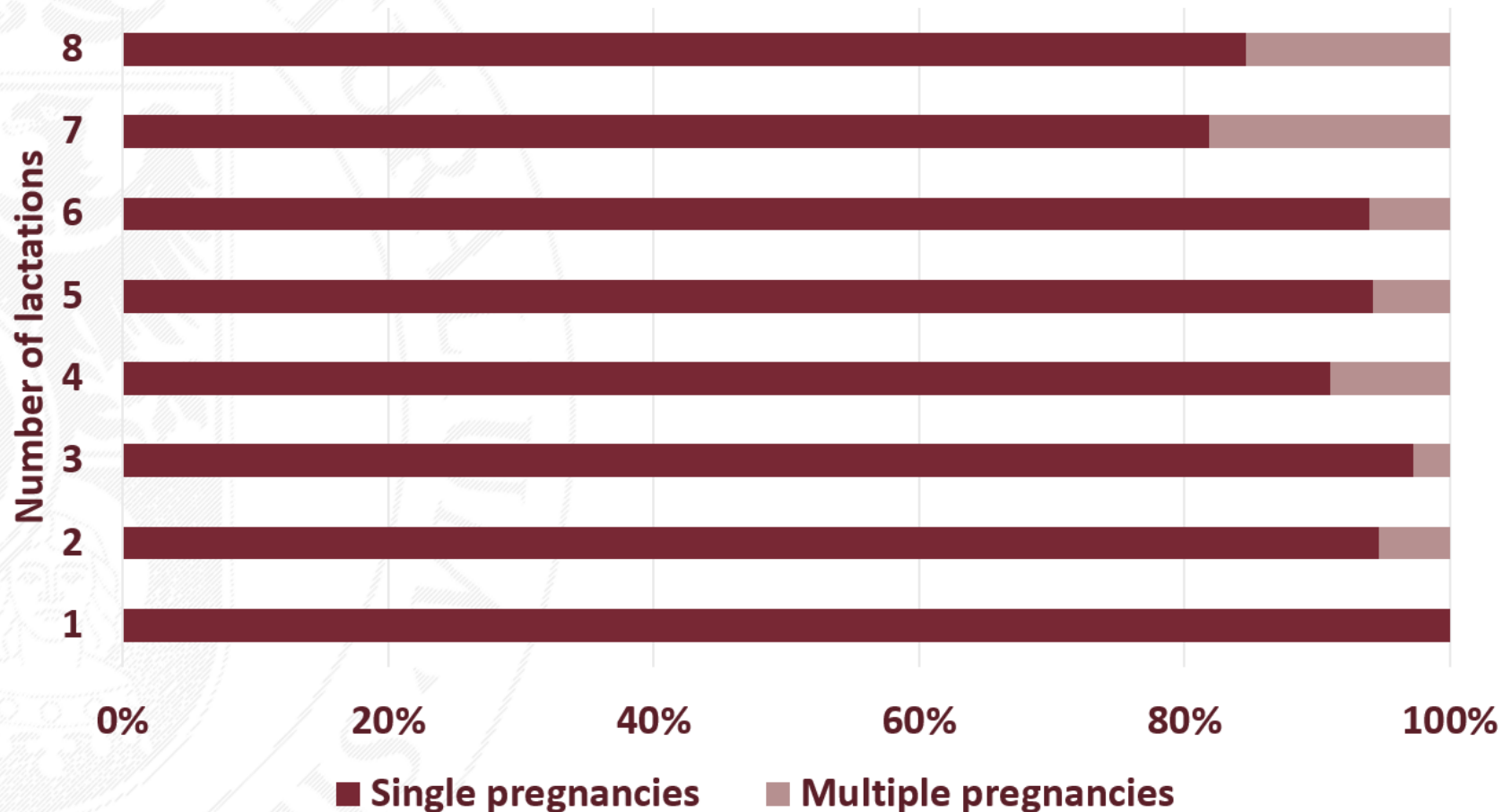


Figure 3. Percentage (%) of single and multiple pregnancies among cows across different lactations

Summary and conclusions

- **Season of conception** does not directly affect the incidence of twin pregnancies, but environmental conditions (e.g. heat stress) may indirectly affect reproductive outcomes.
- **Age of the cow** is a key risk factor – older cows are more prone to multiple ovulations.
- **Reproductive management** should take into account seasonal and age factors to minimize the negative effects of twin pregnancies.
- **Further research** is needed to better understand the mechanisms of multiple pregnancies (nutrition, stress, genetics).

Thank you for your attention!



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