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DOES PRENATAL ENVIRONMENT AFFECT PREWEANING MILK INTAKE IN DAIRY CATTLE: PRELIMINARY RESULTS ?

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‘DEVELOPMENTAL PROGRAMMING’

Stimuli during critical periods of early development

Permanent changes in physiology / metabolism

Short and long-term health consequences

Lifetime performance

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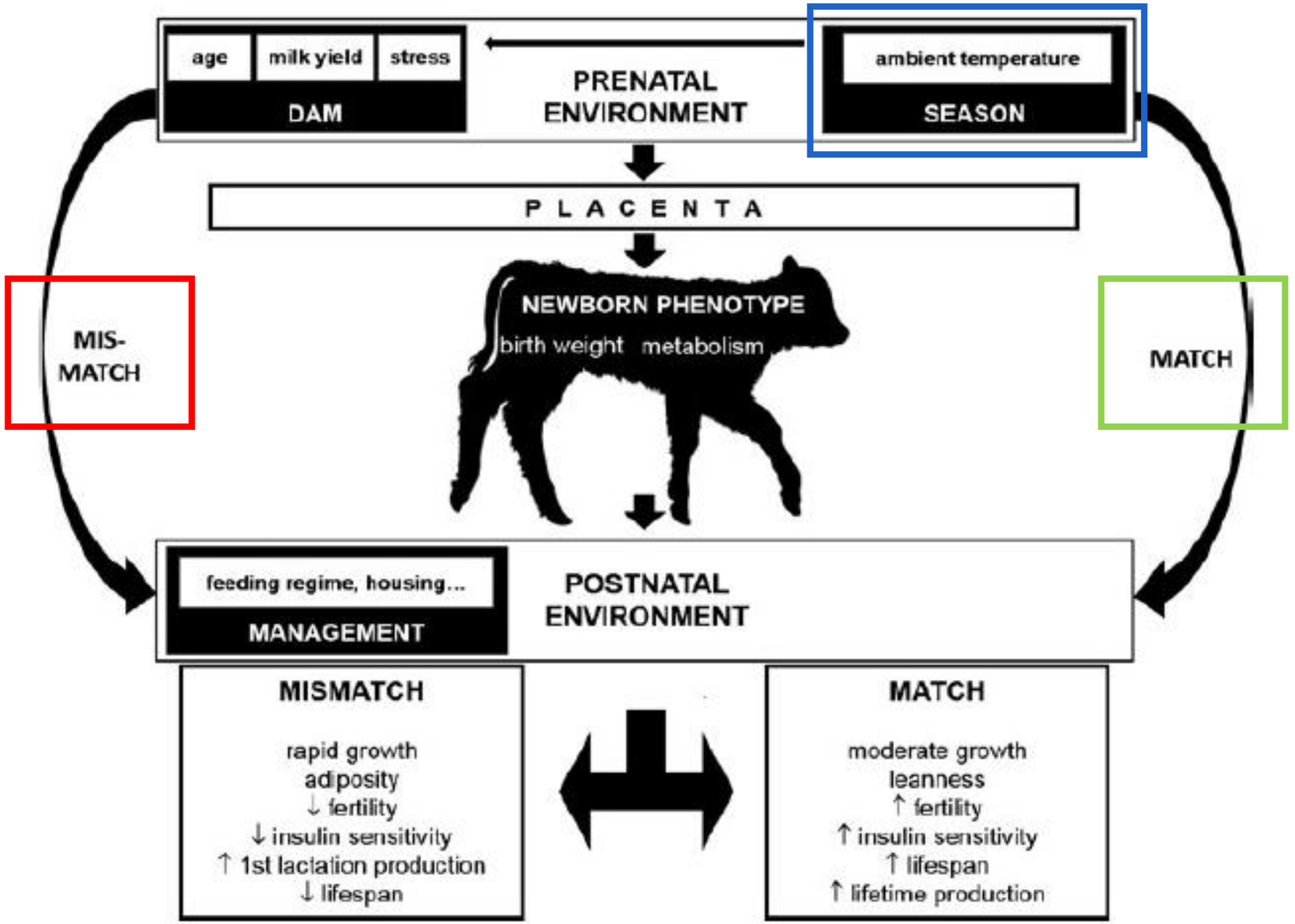

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INTRODUCTION

Nulliparous heifers

Bred at ± 14 months

Large part of body growth during first gestation

Dairy cows

Inseminated < 100 DIM

Produce large amounts of milk while being pregnant

Demanding in terms of energy and nutrient requirements

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HYPOTHESIS

- Prenatal challenge
  - ➢ programmed to live in similar postnatal environment
  - ➢ programmed to use all available nutrients

→ Causing these calves to consume more milk

- Aim of study: searching for prenatal factors that are associated with postnatal milk consumption

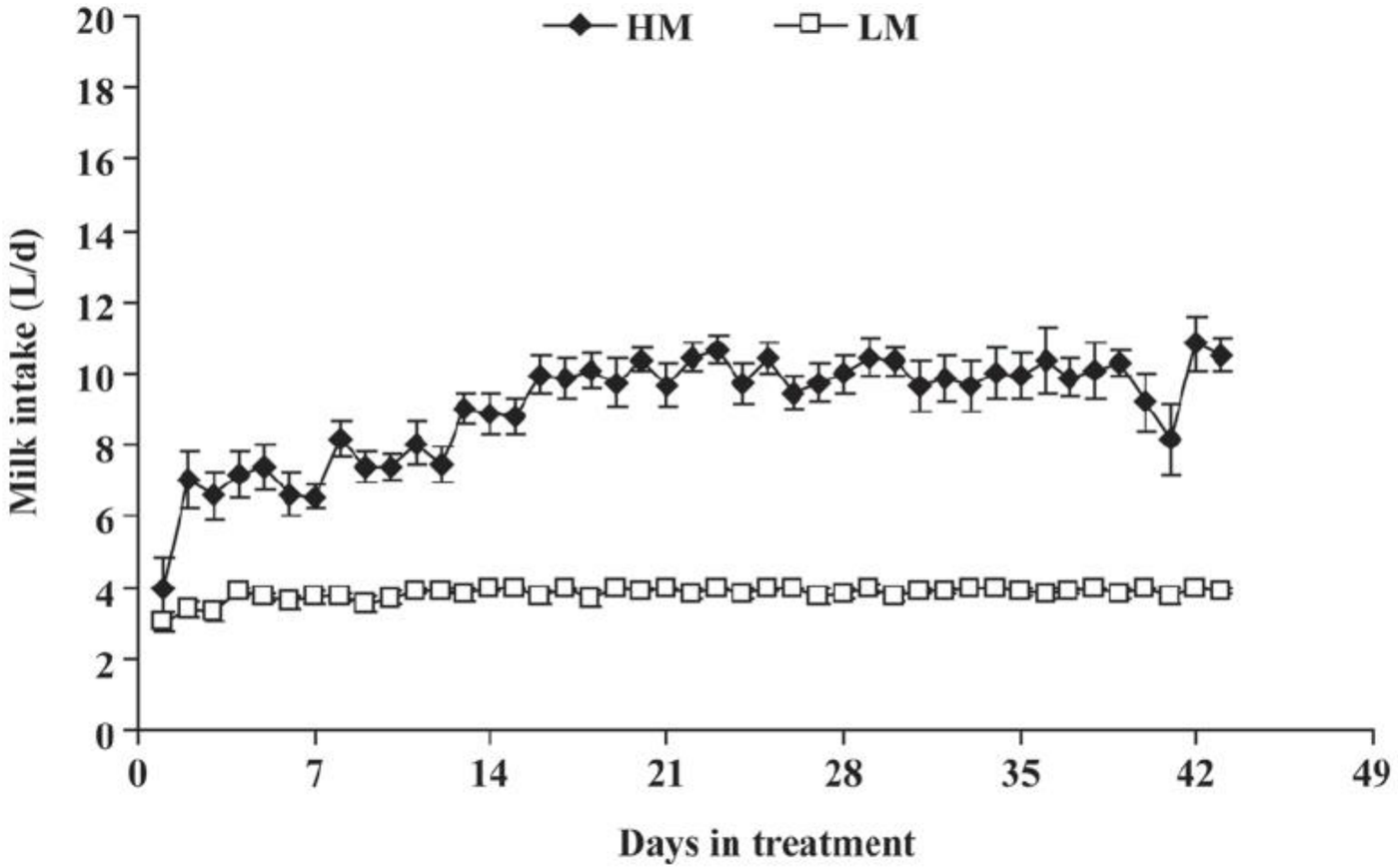


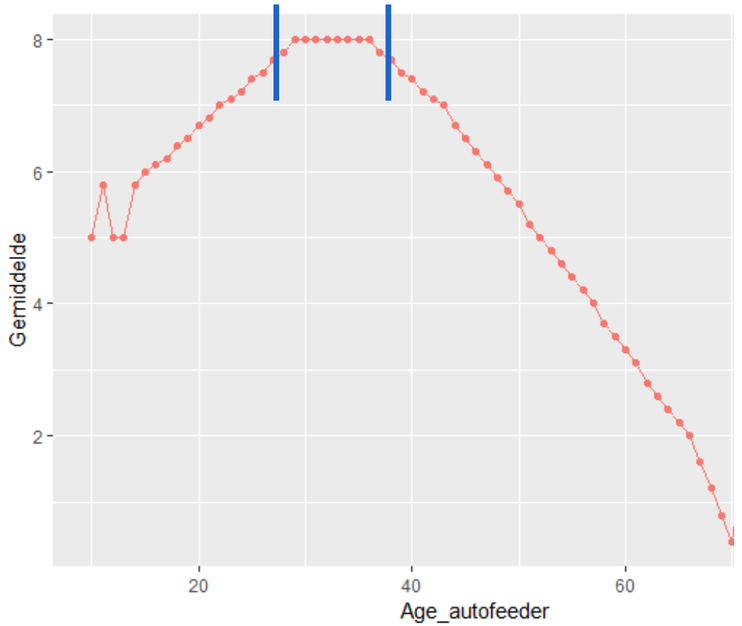
Figure 1. Daily intake (kg; mean ± SE) of milk replacer of calves fed ad libitum (AL) or limited (LIM) milk replacer in experiment 1 (A), or high (HM) and low (LM) levels of milk in experiment 2 (B). Calves in experiment 1 (A) were weaned from d 44 to 48; no milk replacer was offered on d 49 and 50.

Borderas et al. 2009

MATERIALS & METHODS

- Female calves on 1 Flemish farm
- Automated feeder
- Inclusion criteria:
  - Calves with 8l MR allowance
  - Calves without sick observations
    - Sick =
      - < 75% of allowance consumed
      & - < 75% of average drinking speed
      - 7 calves eliminated

  - Total number of calves in study: n = 110



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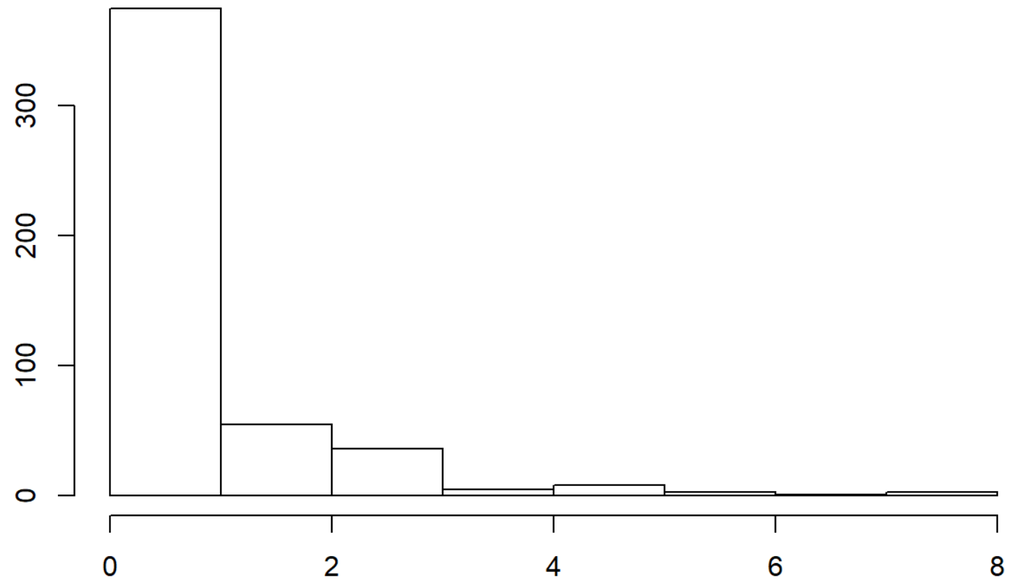
MATERIALS & METHODS

- Data distribution:
  - Outcome variable = amount of milk not consumed
  - 3 datasets analysed:
    - Calves born out of heifers and cows
    - Only heifers
    - Only cows



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PRELIMINARY RESULTS

1. Calves born out of heifers and cows (n = 105)

Univariate:

- Calf birth weight: $p < 0,05$
  - ↗ Birth weight → ↙ Restmilk
- Heifer or multiparous: $p < 0,05$
  - Restmilk ↗ in calves from heifers
- Calf birth season: $p < 0,1$

PRELIMINARY RESULTS

1. **Calves born out of heifers and cows (n = 105)**

   Final model:

   – Calf birth weight is significantly influenced by dam parity ($p < 0,001$)

   – Model with calf birth weight had higher R^2 (0,11)

PRELIMINARY RESULTS

1. Calves born out of heifers and cows (n = 105)

Final model:

Variable		Lsmean	P-value
Birth season			0,05
	Spring	0,364 ± 0,151	Ref
	Summer	0,896 ± 0,168	0,02
	Autumn	0,577 ± 0,117	NS
	Winter	0,880 ± 0,172	0,05
Birth weight			0,02

PRELIMINARY RESULTS

2. Heifer data (n = 49)

Univariate:

Variable	P-value
Birth Weight	NS
BCI	NS
PI	NS
Birth season	0,01
Calving age	NS

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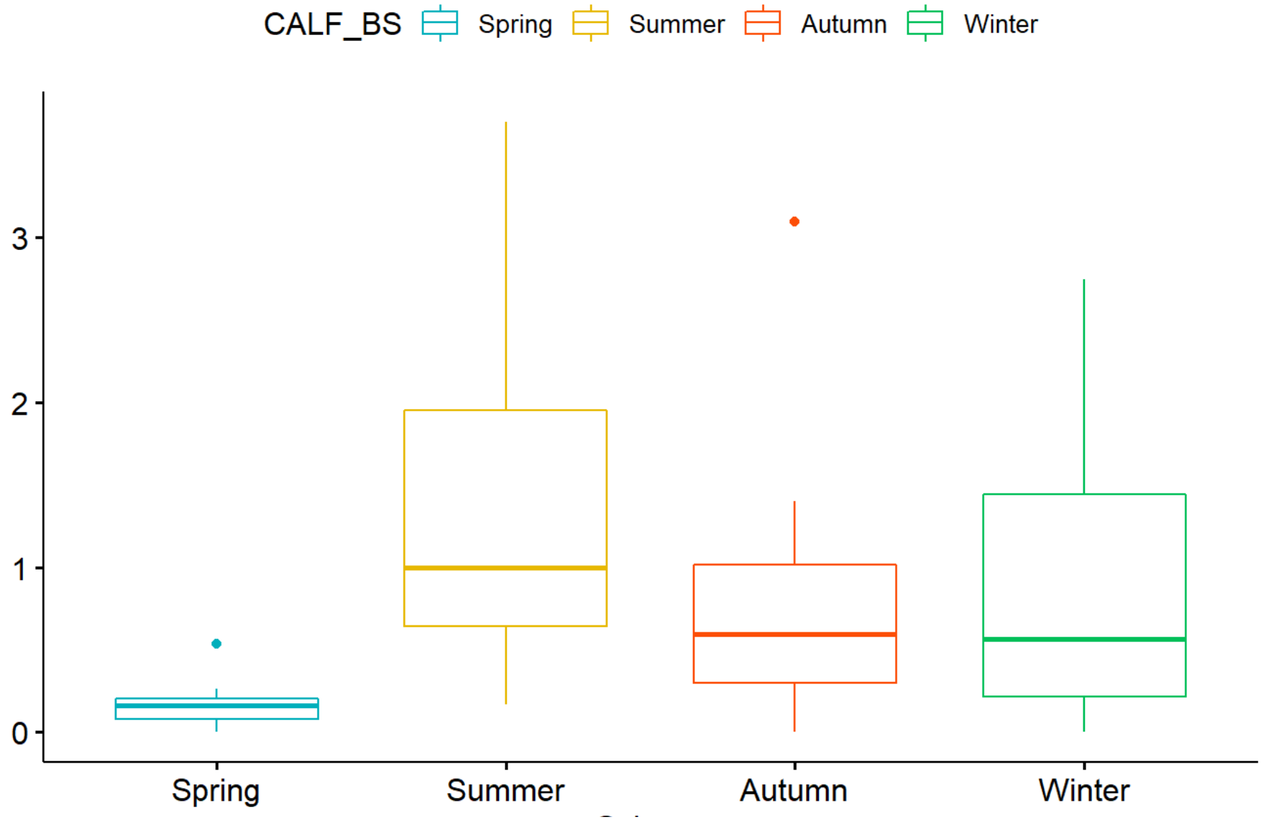
PRELIMINARY RESULTS

2. Heifer data (n = 49)

- Calf birth season: $p < 0,05$

Birth season	N	Lsmean	P-value
Autumn[a,b]	22	0,737 ± 0,180	0,08
Spring[a]	10	0,174 ± 0,267	Ref
Summer[b]	8	1,527 ± 0,299	0,001
Winter[b]	13	0,931 ± 0,235	0,03



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PRELIMINARY RESULTS

3. Multiparous data (n = 50)

Univariate:

Variable	P-value
Birth Weight	0,12
BCI	NS
PI	NS
Birth season	NS
Parity	NS
Average milk production	NS
Average fat	NS
Average protein	NS
Milkbot: Ramp	0,17
Milkbot: Scale	NS
Milkbot: Decay	NS
Milkot: Offset	NS
Milkbot: Persistence	NS
Milk peak	NS
Milk 305	NS
Milk 60	NS
Milk gestation	0,28

PRELIMINARY RESULTS

3. Multiparous data (n = 50)

- Birth weight: p < 0,1

Birth weight	N	Lsmean	P-value
High (> 45kg)[a]	19	0,372 ± 0,144	Ref
Average (> 35 - < 45 kg) [b]	27	0,695 ± 0,121	0,09
Low (< 35 kg) [a,b]	5	0,103 ± 0,281	0,39

CONCLUSION

- Birth season influences milk intake in calves born out of primiparous heifers, but not from cows
  - Calves born in spring consumed more milk

- Calf birth weight influences milk intake in calves coming from cows, but not from nulliparous heifers

DISCUSSION

- Milk intake confounded by numerous other postnatal variables
- Metabolic efficiency possibly a better outcome variable? (Kamal et al., 2015)
- More animals needed
- Effects on postnatal growth and performance to be further evaluated

THANK YOU!

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