Metabolic Disorders and Reproduction in Dairy Cows Receiving a Folic Acid and Vitamin B_{12} Supplement

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Introduction

- Ruminal microorganisms can synthetize B-vitamins (Bechdel et al., 1928 and NRC, 2001)

- However, ruminal synthesis was not sufficient to avoid serum fluctuations of folic acid and vitamin B_{12} around parturition (Girard et al., 1989; Girard and Matte, 1999)

Introduction

- Previous studies showed that a combined supplement of folic acid and vitamin B_{12}:
  - Increased milk production
  - Improved energy balance in early lactation (Graulet et al., 2007 and Preynat et al., 2009)
- Vitamin B_{12} is a coenzyme allowing propionate for its entry into the Krebs cycle

Objectives

Determine the effects of a supplement of folic acid and vitamin B_{12} given around calving in 15 commercial dairy herds on:

- Incidence of metabolic disorders
- Reproduction performance of cows
- Culling rate

Materials and Methods

- 15 dairy herds
- 805 calvings from February 2010 to April 2011
  - 271 primiparous and 534 multiparous cows
- Treatments (weekly 5 mL IM)
  - Control: saline 0.9 % NaCl
  - Vitamins: 320 mg of folic acid and 10 mg of vitamin B_{12}
- Treatments began 3 wk before the expected calving date until 8 wk postpartum

Materials and Methods

- **Data collected on farms every other weeks**:
  - Calving dates and health status (ex. Displaced abomasum?)
  - β-hydroxybutyrate (BHBA) level in milk through Keto-test between 3 and 21 days in milk (DIM)
  - Reproduction and culling data were obtained from Valacta (DHI agency, Sainte-Anne-de-Bellevue, QC, Canada)

Materials and Methods

- Calving ease
  - No assistance
  - Light assistance
  - Difficult calving
  - Surgery
  - Non-favourable calf presentation

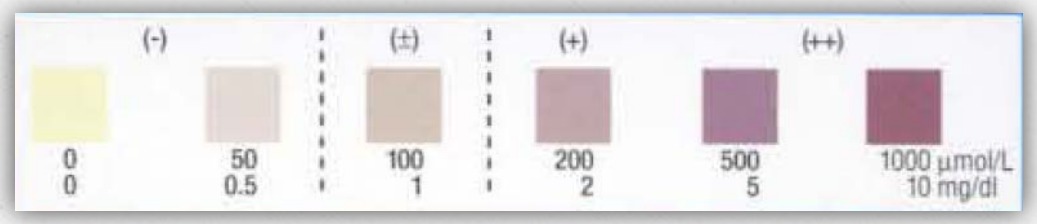
Materials and Methods

Keto-test results:

Up to 100 µmol/L = no ketosis

At or over 100 µmol/L = ketosis

At or over 200 µmol/L = ketosis, severe



Elanco Animal Health, Guelph, ON, Canada

Statistical analysis

- Mixed and GLIMMIX procedures of SAS were used.

Results - Ketosis

Ketosis Incidence According to Treatments

Diseases	Treatments[1]			*P*
	Control	Vitamins	SEM[2]	
Ketosis (%)	**41.8**	**38.3**	3.0	0.37
Ketosis, severe (%)	**12.9**	**12.6**	1.9	0.91

n=800

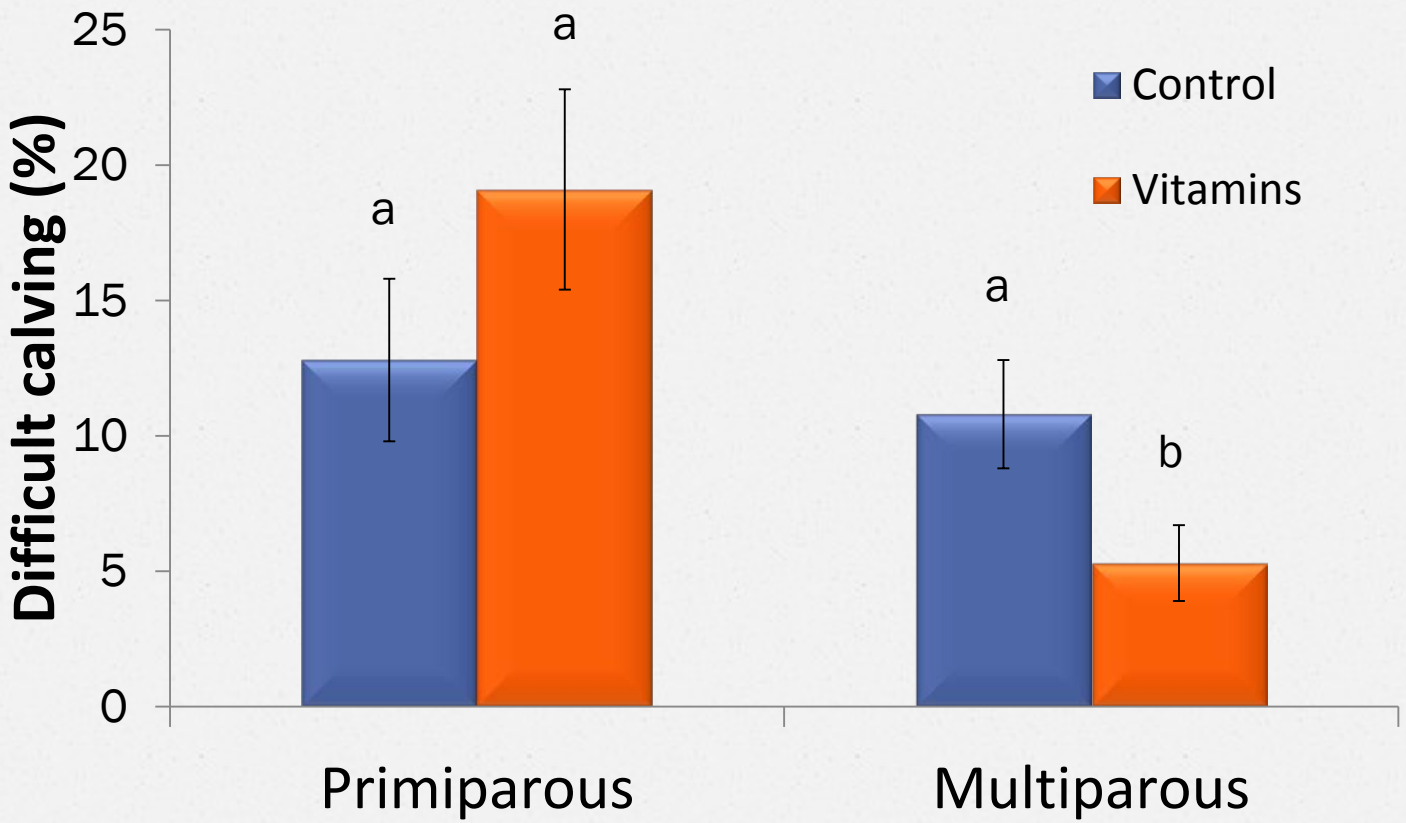
[1] Control: saline 0.9% NaCl; Vitamins: 320 mg of folic acid and 10 mg of vitamin B_{12}

[2] SEM= Standard Error of the Mean

Results - Diseases

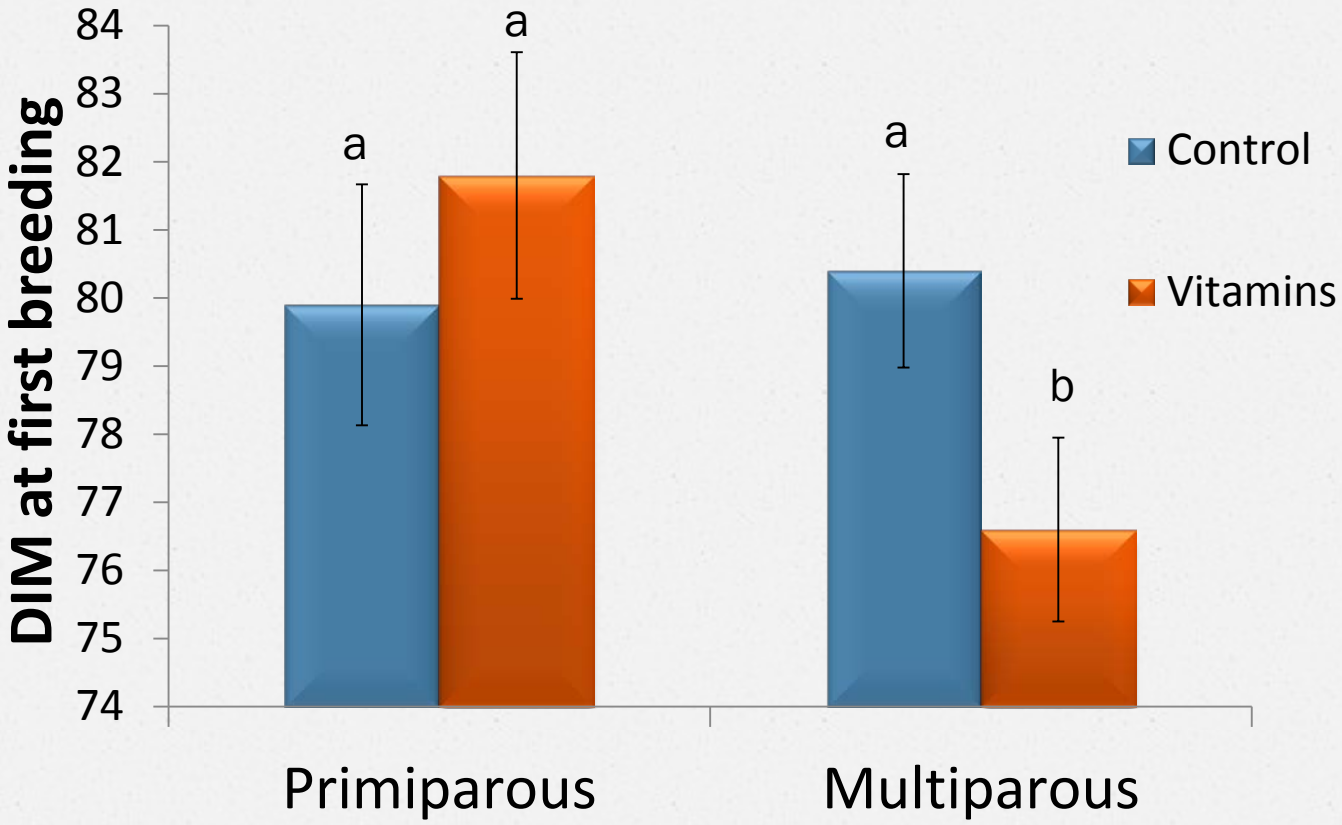
- No treatment effect was found on incidence of displaced abomasum, metritis, retained placenta, mastitis, and milk fever ($P > 0.37$)

Results - Dystocia



Treatment x parity interaction (P = 0.008)

Results - Reproduction



Treatment x parity interaction (P = 0.07)

Results - Reproduction

Items	Primiparous	Multiparous
Days open	130.7	135.5
Conception rate 1st breeding (%)	40.1	36.6
Conception rate 1st and 2nd breedings (%)	71.1	65.1
Breedings/conception	2.3	2.4
Pregnant at 150 DIM (%)	76.9	67.7

No treatment effect ($P > 0.05$)

Results - Culling rate

	Primiparous	Multiparous
Culling rate (%)	15.8	29.3

No treatment effect ($P = 0.58$)
Parity effect ($P < 0.0001$)

Primary culling reasons within 60 DIM:
Diseases (27.7%)
Injury (17.0%)

Conclusion

- Earlier first breeding date for supplemented multiparous cows could be caused by the supplement enhancing the energy metabolism efficiency in early lactation
  - Supported by cows receiving the supplement losing less body weight and body condition score, and having a reduced milk fat content and an increased milk protein content (Duplessis et al., 2012)

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Thank you!

Questions?