

Impact of maternal serum selenium concentration and dam-sourced colostrum provision on transfer of maternal immunity to newborn calves

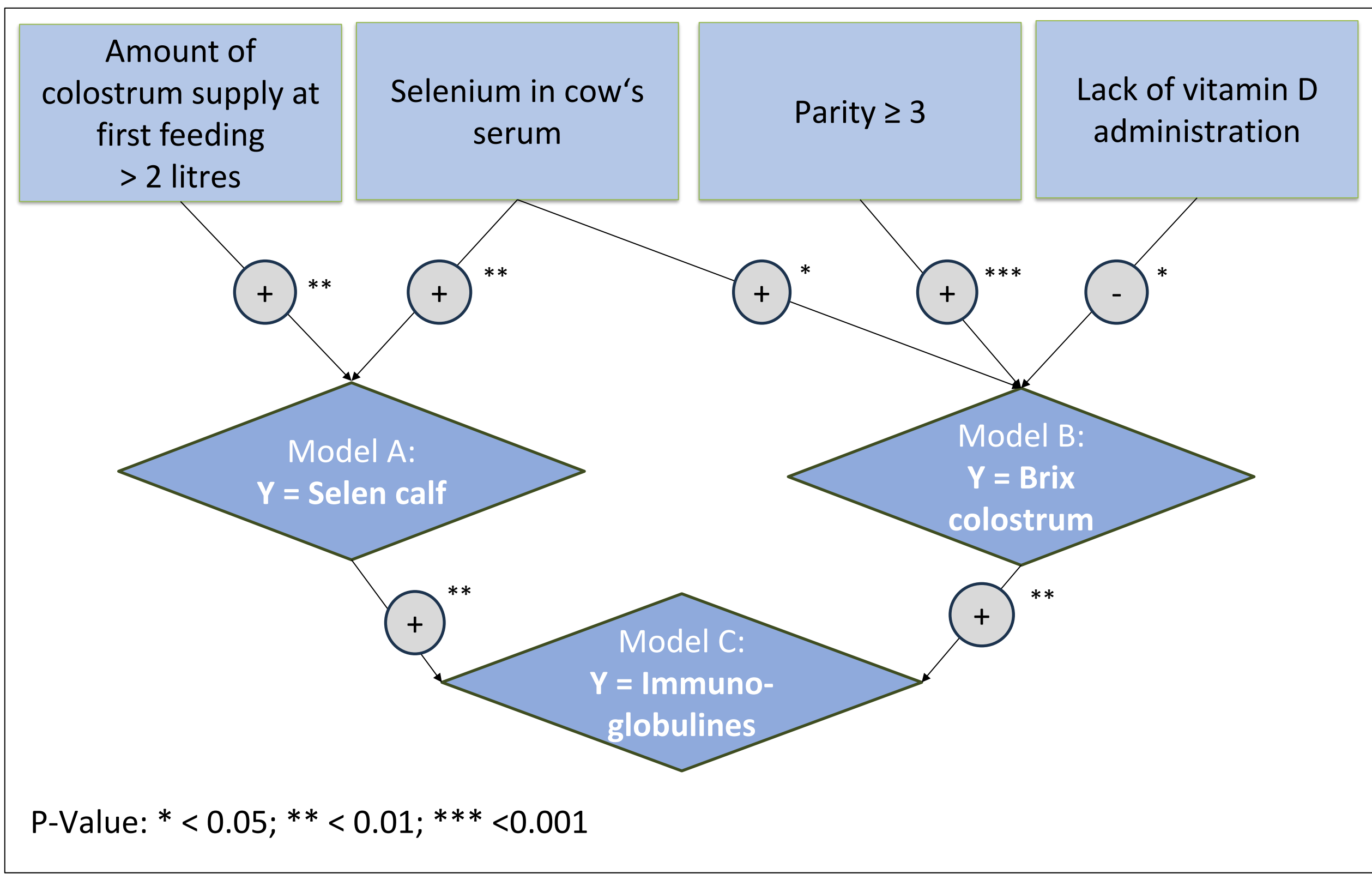
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Maternal impact on calf health



Transfer of maternal immunity via colostrum



Model C		Serum immunoglobulines [g/L]		
Fixed effects		Beta	CI	P-value
(Intercept)		9.99	4.93 – 15.06	<0.001
Log10 (serum selenium)	μmol/L	8.15	2.85 – 13.46	0.003
BRIX	°	0.20	0.09 – 0.31	0.001
Amount of colostrum supply at first feeding	1-2l		Reference	
	>2l	0.91	-0.89 – 2.71	0.319
Time lag between calving and first colostrum feeding	<2h		Reference	
	2-4h	-0.83	-2.53 – 0.88	0.340
	>4h	-2.86	-6.83 – 1.11	0.157
Further fixed effects: calf diarrhoea, other calf diseases, iron substitution				

Goal

- Does **maternal Se serum concentration** and **dam-sourced colostrum supply** have an impact on passive transfer of **Immunoglobulins (Ig)** and on **calf mortality rate** under field conditions in large commercial dairy herds?

Method

- Study population: 915 prepartum cow-calf-pairs from **113 large dairy herds** (mean size: 447 cows)
- **Cows**: examined **3-1 weeks prepartum**, including blood sampling, recording of diseases
- **Calves**: examined **1-4 days postpartum**, including blood sampling, recording of diseases
- **Farm data recording**: herd-specific management of close-up cows, newborn calves and colostrum supply
- Statistical analysis via **generalized linear mixed effects hierarchically structured regression models**

Results

- **216 cow-calf pairs** (44 herds with dam-sourced colostrum supply, model A): **Calves Se** serum concentration was positively associated with the **BRIX** value in colostrum as well as with vitamin D administration and parity
- **913 cows**, (113 herd, model B): **BRIX** value in colostrum associated with the Se concentration in cow's serum and additionally with parity and with hypocalcaemia prophylaxis by vitamin D administration
- **351 newborn calves** (65 herds with dam-sourced colostrum supply, model C): Calves **Ig** serum concentration was highly related to calves **Se** serum concentration and **BRIX**, *but not to time and amount of colostrum fed*

Con- clusion

- Adequate Se status of prepartum cows is vital for the passive transfer of Ig, mediated both by higher serum Se concentration of calves and a higher colostral Ig concentration
- Se **status** of prepartum cows was proven to be a key factor of passive transfer of Ig to newborn calves
- Dam-sourced colostrum potentially reduces overall calf mortality



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Analysis of management factors
(93 herds with > 100 dairy cows):
Dam-sourced colostrum supply is associated with general calf mortality rate until 6 months of age
(Keller et al. Acta Vet Scand. 2024;66 (1): 61)

