

Decrease in type G immunoglobulins in the colostrum of dairy cows and suckling cows during the first 5 days after calving

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INTRODUCTION

The health of young calves at birth depends on the immune defenses provided by colostrum. Few studies focus on the local protection provided by colostral IgG in the digestive tract against the pathogens responsible for neonatal diarrhea (Parreno, 2010). The administration of transition milk during the first week of life provides continuously maternal IgG.

OBJECTIVE

To improve youngstock management after vaccinating cows against diarrhea antigens, it is important to describe the evolution of IgG in the colostrum and transition milk of dairy and beef cows.

MATERIALS AND METHODS

- ▶ Sampling was conducted from January to October 2023 on a total of 20 farms, including 10 dairy farms with milking parlors (6 Holstein and 4 Montbéliard breeds) and 10 beef farms (5 Charolais, 5 Limousin breeds). The enrollment of cows occurred immediately after calving, provided that the farmer confirmed that the calf had not suckled the mother prior to the first colostrum collection. The first sample was obtained shortly after the birth of the calf, aligning with the usual practices of the farmers. Subsequently, for dairy cows, samples were collected twice a day, following the farm's regular milking schedule, starting from the second milking until the tenth milking, which represented the transitional milk phase. In contrast, for safety precautions, only one colostrum sample from all four quarters was taken per day until 5 days postpartum in the case of dairy cows (also representing the transitional milk phase).
- ▶ To maintain optimal conditions, all samples from each farm were promptly transferred in coolers at a negative cold temperature of -4 to -8°C within a 24-hour timeframe to the laboratory (LABOCEA, Fougères). Subsequently, an IgG assay was conducted using the reference method, which involved radial immunodiffusion in agar (IDRing® Box, Bovine IgG TEST, IDBiotech).

This study showed a faster decrease in IgG concentration for dairy breeds than beef breeds. The total mass of IgG produced in transition milk remains considerable. This should encourage dairy farmers to distribute at least transition milk to the calf during the first days of life or to extend the distribution of 250 mL colostrum or transition milk (2nd or 3rd milking) over the first days of life.



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RESULTS

- ▶ The study examined IgG concentrations in a total of 29 Holstein, 19 Montbéliard, 32 Charolais, and 30 Limousin cows (Table 1).
- ▶ The analysis of IgG concentration over time, extrapolated from the data, revealed an exponential decrease in IgG concentration for all breeds following calving (Fig 1).
- ▶ The extrapolated results indicated that, 24 hours after calving, the average IgG concentration had declined by 65% in beef breeds and 73% in dairy breeds.
- ▶ The initial IgG concentration was found to be higher in beef breeds (Tables 2 and 3).
- ▶ The mass of IgG produced during the first 24 hours was significantly higher in dairy multiparous cows compared to dairy primiparous cows (Fig 2).

FIGURE 1: Evolution of the average IgG concentration over time depending on the type of production (extrapolated data)

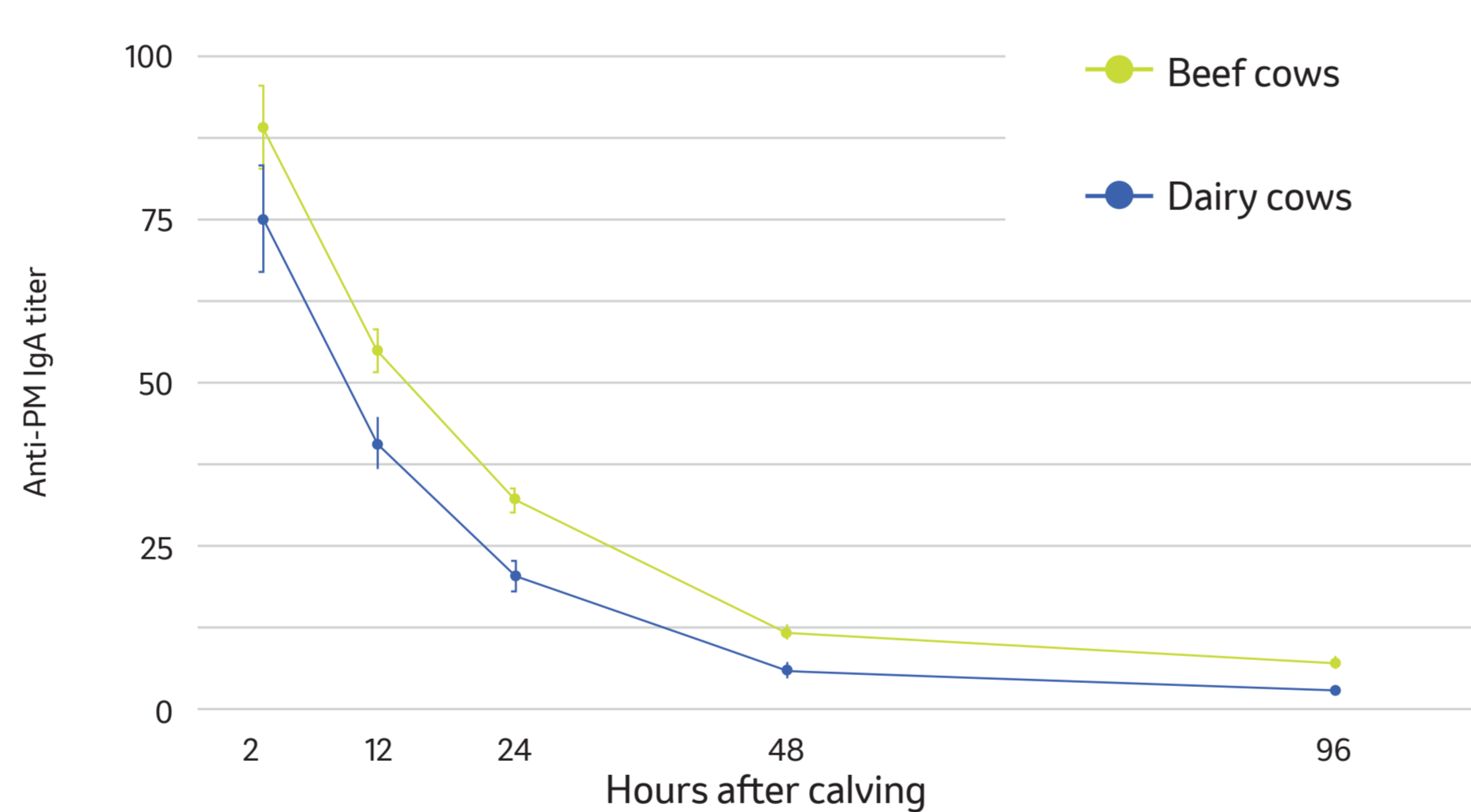


FIGURE 2: Evolution of the mass of IgG (g) over time depending on the breed and parity of dairy cows

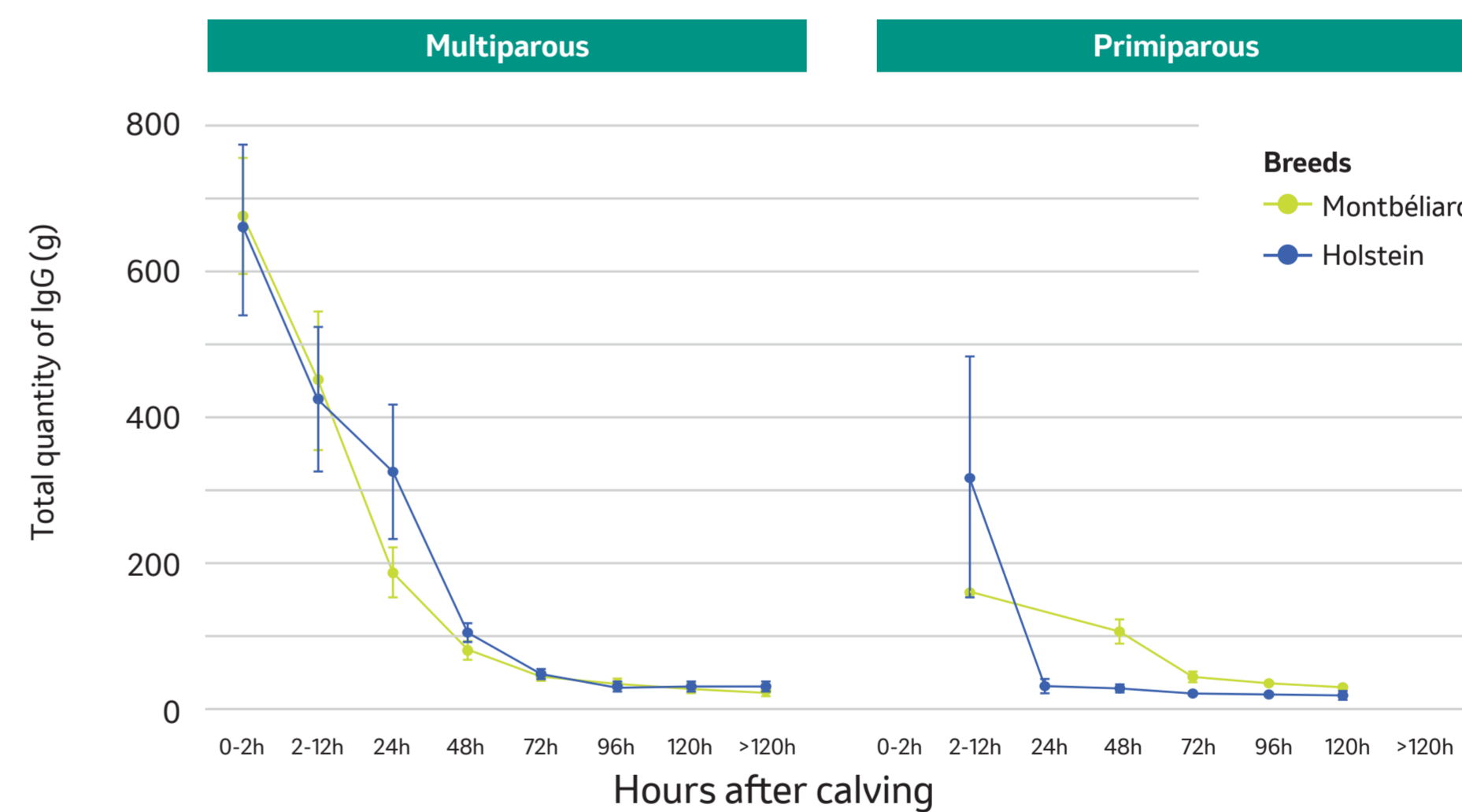


TABLE 1: Interval between calving and the first collection of colostrum on farms according to breed.

Breeds	Number of cows (Primiparous; Multiparous)	Calving- First milking interval (hours)			
		Mean	Median	Minimum	Maximum
Holstein	29 (5;24)	05h11	03h37	00h15	23h00
Montbéliard	19 (2;17)	04h57	03h45	00h15	11h30
Limousin	30 (11;19)	00h29	00h15	00h05	04h00
Charolais	32 (5;27)	00h40	00h30	00h05	03h00

TABLE 2: Mean ± standard deviation of IgG concentration measurements (g/L) carried out during the 5 days postpartum on colostrum and transitional milk from dairy cows

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
Holstein	87,7 ± 42,82	36,6 ± 28,99	13,7 ± 10,47	6,1 ± 6,19	3,7 ± 3,39	2,6 ± 1	2,5 ± 0,99	2,3 ± 0,79	2,1 ± 0,76	1,9 ± 0,74
Montbéliard	70,4 ± 45,12	36,7 ± 29,5	14,7 ± 16,42	8,1 ± 11,1	6,2 ± 10,34	4,8 ± 7,49	3,9 ± 4,88	3,3 ± 3,61	2,9 ± 3,01	2,5 ± 2,33

Sampling 1 took place in the hours following calving, the following samples corresponded to the usual milkings with the rest of the herd.

TABLE 3: Mean ± standard deviation of IgG concentration measurements (g/L) carried out during the 5 days postpartum on colostrum and transitional milk from beef cows

	Sample 1 (Day 1)	Sample 2 (Day 2)	Sample 3 (Day 3)	Sample 4 (Day 4)	Sample 5 (Day 5)
Limousin	89,7 ± 31,4	28,9 ± 17,58	12,8 ± 6,47	7,8 ± 5,43	5,6 ± 4,44
Charolais	104 ± 39,68	39,8 ± 29,86	15,6 ± 11,67	9,1 ± 8,12	7,4 ± 5,81

Sample 1 took place in the hours following calving. The following samples took place once a day. Sample 2 took place the day after calving day, 23 hours on average after the first sample.

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