

Development of a field test to evaluate colostral immunity transfer in young calves



Guyot H.¹, Dubreucq P.¹, Lebreton P.², Garnier C.², Sandersen C.¹

¹University of Liège-Faculty of Veterinary Medicine, Clinical Department of Production Animals, Bovine Ambulatory Clinic. 4000 Liège – Belgium (hugues.guyot@ulg.ac.be)

²NBVC (Early Health Indicators) & Iodolab. 69570 Dardilly - France



BACKGROUND

Failure of transfer of immunity from dam's colostrum generates a negative effect on calf health leading to increased morbidity and mortality (De Nise et al., 1989; Wittum and Perino, 1995). Unawareness of the colostral quality and variation in the calf's capability to efficiently absorb immunoglobulins (IgG) supports the need for specific evaluation of the immunity transfer at a herd level. **The aim of the study was to evaluate the performances of a field test for passive immunity transfer (PIT) in calves.**

MATERIAL & METHODS

Patients

⇒ Healthy calves, 2-6 days of life, beef and dairy breeds.

Blood sampling

⇒ Jugular vein, 12 mL syringe (18G needle)

⇒ 2 mL directly to Calf-IgG-Test

⇒ The rest of blood was placed into a plain tube, centrifuged and serum separated and frozen (-20°C) for further analysis.

Biochemical investigations

⇒ Calf-IgG-Test: ½ quantitative field test developed by Ambulatory Clinic (ULg).

Laboratory assays:

⇒ IgG in serum : Radial-Immuno-Diffusion (IODOLAB), as the « Gold-Standard »

⇒ Total Protein in Serum (TPS) : refractometer (EUROMEX® RD.5712).

Data analysis

⇒ Determination of Se, Sp, NPV/PPV, Y, K of Calf-IgG-Test

⇒ Unpaired t-test compared [IgG], coagulation time and TPS

The Calf-IgG-Test



Calf-IgG-Test

⇒ 5 mL plastic tube containing K₂-EDTA, a solution with 100 mg Glutaraldehyde and excipients. Single-use (RTU).

Procedure

① Import 2 mL of fresh blood directly into the Test-tube.

② Rotate the tube 2 times to mix. Switch on the timer.

③ Every 30 seconds, return the tube again and notice the time of blood coagulation (adherent clot in the bottom of tube).

Interpretation of the Calf-IgG-Test

Coagulation time	Interpretation	[IgG]
≤ 1 MIN.	Correct PIT	≥ 10.1 g/L
1 MIN. 30 SEC.	Doubtful	-
≥ 2 MIN	Failure PIT	< 10.1 g/L

RESULTS

A total of 102 healthy calves, from 18 Belgian farms, 48 females and 54 males, 84% from beef breed, aged 5 ± 1 day (mean ± SD), weighed 47 ± 7 kg were assayed. Among this sample, 32% of calves presented a failure of PIT. The IgG concentration, the coagulation time (Calf-IgG-Test) and the TPS in this group were 6.6 ± 2.0 g/L, 4 ± 3 minutes and 53 ± 6 g/L, respectively. For the group of calves with correct PIT, these parameters were 20.4 ± 7.4 g/L, 1 ± 1 minute and 62 ± 6 g/L, respectively. These values are significantly different (p<0.001) from the other group. Compared to RID, Calf-IgG-Test had a **Sensitivity of 97%**, a **Specificity of 80%**, a Negative Predicting Value of 98%, a Positive Predictive Value of 70%, a Youden of 0.77, a Kappa of Cohen of 70% and a X² of 53 (p<0.001). Assessment of PIT using TPS presented a Se of 76%, a Sp of 83%, a NPV of 88%, a PPV of 68%, a Y of 0.58, a K of 57% and a X² of 33 (p<0.001).

DISCUSSION / CONCLUSIONS

Calf-IgG-Test principle is based on the aptitude of blood's gamma-globulins to coagulate blood while in contact with glutaraldehyde (Sandholm, 1974). In this study, 32% of calves presented a failure of immunity transfer, which is in accordance with literature (Weaver et al., 2000). Previously, other glutaraldehyde tests were described but showed much lower performances (Tyler et al., 1993). Calf-IgG-Test presents good concordance with gold-standard and is a reliable control for a field test. It actually seems to be the most accurate and user-friendly field semi-quantitative test for the determination of PIT in calves.

References

DeNise SK et al. J Dairy Sci. 72 (1989),552-54
Tyler JW et al. J Vet Intern Med. 10 (1996),82-84

Sandholm M. Res Vet Sci. 17 (1974),32-35
Weaver DM et al. J Vet Intern Med. 14 (2000),569-77

Wittum TE & Perino LJ. Am J Vet Res. 56 (1995),1149-54

