Validation of refractometry as a fast method to quantify IgG in serum of newborn piglet in farm

Abstract 31661

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Colostrum samples in swine are highly heterogeneous and difficult to collect. On the other hand, traditional techniques used for the determination of IgG such as IDR, Elisa and Inmunocrit, are laborious and expensive. Brix® refractometer was developed for measuring the amount of sucrose in a solution. Studies conducted in cattle (Morrill et al., 2013; Quigley et al., 2015) reveal that Brix® values are positively related to the concentration of IgG of colostrum and serum.

Objective

This study was conducted to validate the refractometry technique as a quick and economical analytical procedure to determine the concentration of IgG in serum of 4 day-old piglets.

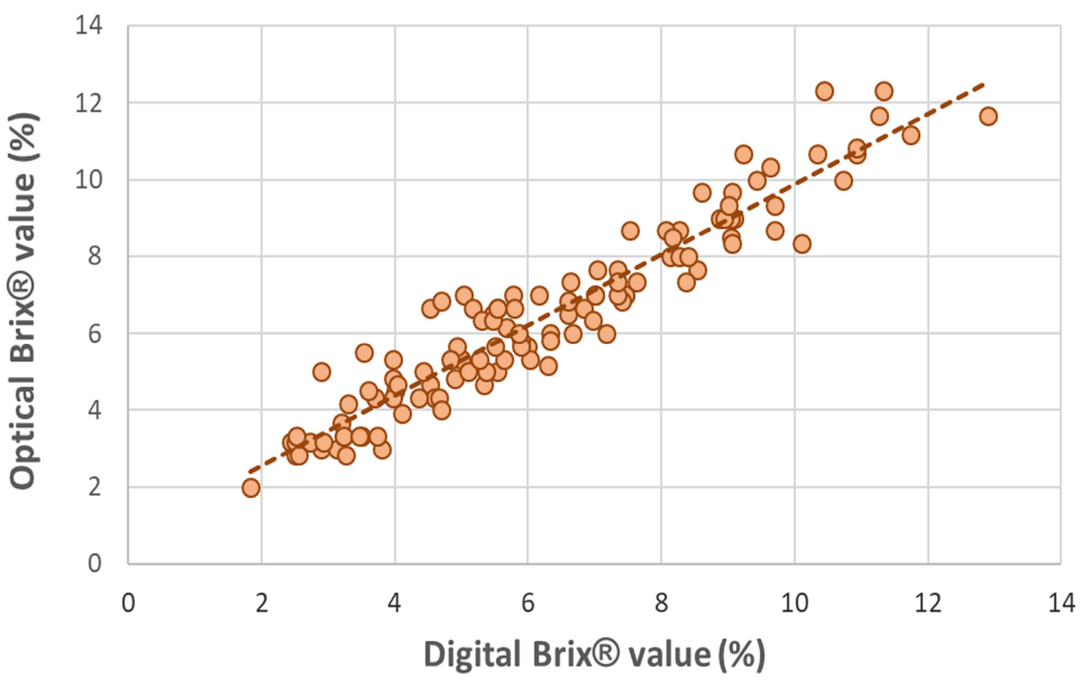
Material & Methods

- Completely randomized design
- Blood sampling on d 4 after birth
  - 120 piglets (♂ Duroc x ♀ LDxLW) of 40 sows of different parity
  - 3 piglets per litter – 1 per each birth BW group (1.04 ± 0.19, 1.50 ± 0.10, 1.93 ± 0.20 kg/ piglet)
  - Each serum sample was analyzed by 3 different methodologies
    - Radial Immunodiffusion Test of Quantification of Porcine IgG (IDR- IgG)
    - Optical Brix® refractometer (0 to 32% Brix)
    - Digital Brix® refractometer (0 to 50% Brix)

- Statistical analysis
  - Pearson's correlations between Digital and Optical Brix® readings, and between IgG by IDR and BRIX® readings using Proc CORR were determined.
  - Linear and quadratic responses of IDR- IgG concentration to Brix® readings were studied.
  - Linear regression equations using Stepwise selection method of PROC REG were performed.
  - Data are analyzed using SAS® Enterprise Guide 7.12 software (SAS® Institute Inc., 2016)

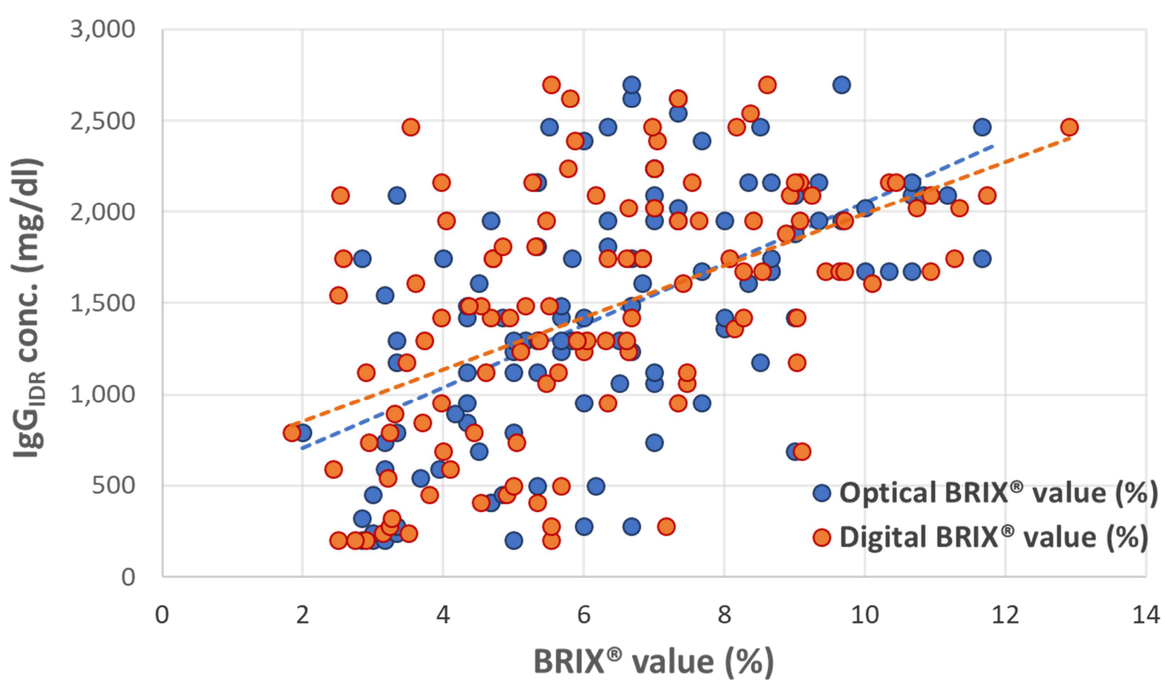
Results

- There was a high correlation between Optical and Digital Brix® values (r = 0.95; P< 0.001).



Optical BRIX® (%)= 0.92 (±0.03; P< 0.001) x Digital BRIX® (%) + 0.71 (±0.76) (R^2 = 0.91; P < 0.001)

- There were a linear and positive relationships between IDR- IgG concentration and Optical Brix® value (r = 0.59; P< 0.001), and between IDR-IgG and Digital BRIX® value (r = 0.54; P< 0.001).



IgG conc. (mg/dL) = 373 (±145) + 167 (±21; P<0.001) x Optical BRIX® (%) (R^2 = 0.35; P < 0.001)

IgG conc. (mg/dL) = 525 (± 143) + 147 (± 21; P < 0.001) x Digital BRIX® (%) (R^2 = 0.29; P < 0.001)

Average IDR- IgG and its corresponding Digital BRIX® value in serum

IDR-IgG, mg/dL	739	1,169	1,510	1,806	1,829	1,937	2,099
Brix® value, %	3	4.5	6	7.5	9	10.5	12
	Low IgG intake		Adequate IgG intake				

Conclusions

1. Refractometry techniques allow to quantify the concentration of IgG in serum of newborn piglets in a simple, fast and economic way, with a correlation of 0.54 and 0.59 for Digital and Optical Brix® refractometer, respectively.

2. Optical and Digital refractometers have both similar accuracy and validity.

3. Readings with the digital refractometer are determined faster than those with the optical refractometer.

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