



Avaliação da correlação entre proteína plasmática total do soro de bezerras F1 mestiças Holandês x Zebu avaliada com refratômetro óptico e digital ¹

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Resumo: A avaliação da transferência da imunidade passiva indica a possível condição de saúde e sobrevivência de bezerros durante seu desenvolvimento. A verificação da transferência de imunidade aos bezerros pode ser feita através do uso de refratômetros de proteína sérica óptico (PTO), que avalia indiretamente a concentração de IgG dos bezerros neonatos e apresenta resultados práticos e rápidos nas fazendas. No último ano foram lançados refratômetros digitais que também podem servir a este propósito. No Campo experimental da Embrapa Gado de Leite, em Coronel Pacheco, MG, foram avaliadas amostras de soro de 38 bezerras. As amostras foram colhidas, 48 horas após o nascimento, em tubos sem anticoagulante e centrifugadas a 3000 RPM por dez minutos para obtenção do soro e posterior avaliação nos refratômetros. Observou-se que a correlação entre os valores totais de proteína no soro obtidas com refratômetro óptico (PTO) e digital (PTD) foi elevada, indicando que a avaliação da transferência da imunidade passiva pode ser realizada com eficiência por ambos os métodos.

Palavras-chave: refractometria, proteína sérica, transferência de imunidade passiva

Evaluation of the correlation between total plasma protein of serum of F1 crossbred Holstein x Zebu calves evaluated with optical and digital refractometer

Abstract: The evaluation of the transfer of passive immunity indicates the possible health status and survival of calves during its development. The assessment of immunity transferred to calves can be done through optical refractometers, which, indirectly, measures IgG levels in blood serum of newborn calves and offers practical and quick results at farms. Last year, digital refractometers were launched and they can also suit this purpose. In Embrapa Gado de Leite experimental field, located in Coronel Pacheco-MG, serum samples from 38 calves were evaluated. These samples were collected, 48 hours after birth, in tubes with no anticoagulant and then centrifuged at 3000 rpm for ten minutes to obtain the serum to be evaluated in refractometers. It was observed a high that the correlation between total serum protein values obtained by optical refractometer and digital was high, indicating that the evaluation of the passive transfer of immunity transferring can be efficiently performed by both methods.

Keywords: refractometry, serum protein, passive immunity transfer

Introduction

The evaluation of the passive transfer of immunity is essential in calves creation system, hence it indicates the possible health condition and survival of these animals during their development. Factors such as concentration of immunoglobulins levels in colostrum, volume drunk, time interval between birth and the intake, sanitary quality of colostrum and absorption capacity determine the effectiveness of passive transfer of immunity (Davis *et al*, 1998).

After providing colostrum it is important to determine the efficiency of transfer of passive immunity to newborn calves. IgG measured by a refractometer can be used as a direct analysis of passive immunity transferring. If calves, 24 to 48 hours after birth, have less than 10 mg of IgG/serum mL, it indicates that the immunity transferring has failed. The evaluation of total serum protein indicates, indirectly, the absorption of



immunoglobulins, as there is a correlation of 0.71 between total protein and serum IgG of calves with 24 hours of life (Quigley, 2001). This occurs because the most consumed protein in colostrum is IgG. The evaluation of total protein is therefore an important parameter to be evaluated when it is desired to know the efficiency of immunity transferring. To evaluate total protein, optical serum protein refractometer can be used. Quigley (2001), considers intake of colostrum sufficient when calves have total protein levels in serum above 5.5 g/dL and when it is below 5.0 g/dL, it indicates failure on the transfer of passive immunity. Last year, digital refractometers were launched and they can also suit this purpose.

The objective of this study was to correlate the transfer of passive immunity by assessing the Plasma Protein Total serum made with optical and digital refractometer in calves F1 crossbred Holstein x Zebu.

Material e Methods

The experiment was conducted at experimental field Embrapa Gado de Leite, in Coronel Pacheco, MG, from November 2014 to February 2015. Serum samples were evaluated in 38 calves at 48 hours old.

To evaluate the transfer of passive immunity, blood samples were collected (5 mL) of calf 48 hours of life in tubes without anticoagulant, samples were centrifuged at 3000 rpm for ten minutes. After calibration of refractometers a serum aliquot was used for evaluation in two types of serum refractometers, optical and digital protein.

The experiment was set up following the experimental design completely randomized. Analysis of the correlation between serum total protein was performed on optical refractometer and serum total protein in digital refractometer.

Results and Discussion

Several tests can be performed for the evaluation of passive transfer in dairy cattle farms, for example, enzyme-linked immunosorbent assay (ELISA), sodium sulfite turbidity test, zinc sulfate turbidity test, serum GGT activity and whole-blood glutaraldehyde coagulation test. However, one of the most commonly used test is the evaluation of the concentration of serum total protein through refractometry, due to its convenience, quickly and inexpensively, besides presenting high correlation with serum immunoglobulin.

Weaver *et al* (2000) reported that the serum protein concentration of 5.2 g/dL is equivalent to an IgG concentration of 1,000 mg/dL. Calloway *et al* (2002) reports that the cutting point of 5.0-5.2 g/dL, when correlated with serum IgG concentration of 1,000 mg/dL, produced the most accurate result for estimating adequate passive transfer, obtaining sensitivity greater than 0.80, greater specificity than 0.80 and proportion of calves correctly classified higher than 0.85. According Quigley (2001), the correlation between total serum protein and IgG in 24 hours old calves is 0.71.

Despite showing good accuracy, the use of serum total protein is most appropriate for the evaluation of passive immunity transfer of the herd, for the individual evaluation many calves may be misclassified (Godden, 2008), since the accuracy of the test involves factors such as the quality of the instrument, the age of the animal and the type of protein absorbed (Quigley, 2001). The instrument should be checked prior to use to ensure the reliability of results obtained. In general, the accuracy of commercial refractometers is sufficient for the measurement of total serum protein in field. According Feitosa (2001), in the newborn, the albumin concentration is somewhat variable and differences in protein concentrations are due almost exclusively to the absorption of immunoglobulins after ingestion of colostrum. However, as the calf ends colostrum intake period and starts to receive the liquid diet, this correlation is decreased. Thus, the recommendation is to make evaluations within 48 hours after the first intake of colostrum. The type of protein absorbed in colostrum may vary if using colostrum supplement and replacer, leading to changes in the accuracy (Quigley, 2001).

The use of serum total protein in the herd reflects the proportion of calves that have failed in the passive transfer of immunity, being an important tool for monitoring the management of colostrum (Godden, 2008). According McGuirk (2004), for evaluating the herd must be collected at least 12 samples from clinically normal animals aged 24 hours and seven days. Calculate the proportion of animals that received colostrum properly, with the cutoff 5.5 g/dL in serum total protein. If more than 20% of animals exhibit serum total protein value below the cut point, it is considered that failure has occurred in the transfer of passive immunity in cattle.

The correlation between total protein in optical refractometer and total protein in digital refractometer was high, at 0.9588 parametric Pearson correlation ($P < 0.05$). This result indicates that the evaluation of the transfer of passive immunity can be performed evaluating total protein in either optical or digital refractometer.



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Conclusions

The correlation found between total protein in optical refractometer and total protein in digital refractometer was high, indicating that the evaluation of passive immunity transfer can be performed efficiently in both the total protein by optical refractometer as total protein in digital refractometer.

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