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Investigation on immunoglobulin G concentration by colostrometry, refractometry and an ELISA-technique in colostrum of mares

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Introduction

Insufficient absorption of immunoglobulin G (IgG) by the foal in the first hours after birth leads to an inadequate immunological status and correlates with a high predisposition for neonatal infections (McGuire et al. 1977, Thein et al. 1983, Gènin und Clément 1989). As the transfer of immunoglobulin from the mare to the foal is minimal prepartum and the passage of these molecules at a high range is possible only during the first 12 hours of life, the quality of colostrum is a crucial parameter for the future health of the foal (Crawford et al. 1977, Chavatte-Palmer et al. 2001). The evaluation of the colostrum quality is one of the most important steps in the prevention of the failure of immunoglobulin transfer. The goals of the present study were to compare different methods

of measuring the IgG-concentration in the colostrum of mares, to determine the kinetic of the IgG-level in the first 12 hours post partum and to determine if the number of parturitions has an influence on the amount of IgG provided by the mare.

Material and methods

Colostrum samples were collected five times within the first 12 h post partum (p.p.) (n=360) of each half of the udder from 36 Warmblood mares of one stud farm. The foals were muzzled over the first 6 hours post natum. Additionally blood sample were taken from each mare. The mares were divided into three groups (group I: 1. parturition, three and four year-old mares; group II: 3. parturition, five to seven year-old mares; group III: 4. and > 4. parturition, older than seven year-old mares). The density (colostrometry) and the refraction index (refractometry) as non-specific parameters were measured in the native colostrum immediately after sample collection. The concentration of immunoglobulin G (IgG) measured by ELISA as a specific method were determined from deep frozen samples.

Results

- There was no difference in the colostrum volume between the two halves of the udder in the 36 healthy mares.
- A significant correlation was determined between the refraction index and the colostrum IgG-concentration ($r = 0.93$), and between the density and the colostrum IgG-concentration ($r=0.88$).
- Primiparous mares have a greater mean concentration of IgG than multiparous mares do (68 mg/ml and 51 mg/ml, respectively). Within the first three hours however, primiparous mares have a significantly lower amount of IgG (31.51 g and 48.56 g, respectively).
- Multiparous mares have a mean colostrum volume of 1020 ml and, in primiparous mares, a mean volume of 527 ml was determined within the first three hours post partum.

Discussion

In this study fast, inexpensive and non-specific field-methods methods of measurement of the IgG-concentration in colostrum (colostrometry and refractometry) were compared to a technically more sophisticated and specific method (ELISA) on a larger number of samples compared to so far published data (Lavoie et al. 1989, Chavatte 1998). As in previous studies results from specific and non-specific methods correlate significantly (Waelchli et al. 1990).

The kinetic of IgG-concentration post partum shows a rapid decrease all ready 2 hours after parturition. These results are different to those of Warko and Bostedt (1993) and Luft (2000) who noticed a significant lesser IgG-level first 6 or even 9 hours post partum.

Conclusion

Both field-methods were considered suitable for determining the colostrum IgG-concentration. The refractometry is the more reliable and practicable technique. However the latter method is the more expensive one.

The greatest concentration of IgG was found in mares of the third lactation. These mares also produce great volumes of colostrum. Consequently colostrum banking should be performed with horses of this group.

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