Oncology Research and Reviews

Short Communication ISSN: 2516-8258

Indicators of passive immunity failure in neonatal calves

Bulent Elitok*

Afyon Kocatepe University, Faculty of Veterinary Medicine, Department of Internal Medicine, 03200/Afyonkarahisar-Turkey

Abstract

Newly born calves need colostrum and its immunoglobulins, because they are hypogammaglobulinemic or agammaglobulinemic at birth. In the first days after birth, passive immuno-deficiency occurs after 24-48 hours in the animals when do not take enough colostrum. Serum gamma-glutamyl transferase (GGT) and total protein measurements are also give important information about passive immunity as well as immunoglobulins (especially IgG).

Introduction

Passive immunity deficiency; inadequate IgG concentration in the colostrum is directly related to the lack of adequate colostrum removal and IgG absorptive defects [1-3]. At the end of the first 24 hours following birth, the ability of the intestinal epithelium to absorb macromolecules is lost and passive immune deficiency is formed. [1,4]. Serum IgG, GGT) and TP measurements are the most common indicators of passive transfere failure in calves.

Immunglobulin G (IgG)

Measurement of serum IgG concentrations is considered to be the most common method for determining passive transfer failure in neonatal calves and a serum IgG concentration of > 10 g / L is considered to be a criterion for providing sufficient passive immunity [3-6].

The primate immunoglobulin, IgG, of bovine colostrum originates from maternal serum IgG and reaches the maximum level in maternal breasts. Mohendra and Merriman (1977) argued that blood serum IgG levels in colostrum-fed calves increased within a few hours [7]. Some investigators [8-10] reported that IgG levels in colostrum after birth were highest in 3rd milk and then decreased.

Gamma-glutamyl transferase (GGT)

Many researchers [11,12] who claim that Ig measurements are expensive and time-consuming have investigated some of the alterations of some parameters, such as enzymes that would prove passive immunity. The detection of certain enzymes such as GGT provides important information on passive immunity and colostrum uptake in newborns [11]. As a matter of fact, in the colostrum-receiving animals, the maternal GGT enzyme is taken together with the immunoglobulins at high dose, and the level of this enzyme in the calf blood increases.

Weaver *et al.* (2000) reported that there is a positive correlation between GGT activity and Ig concentrations, and that GGT may be a good indicator of passive trans- ference in the cold [13]. Perino *et al.* (1993) reported that there is a parallels between GGT and IgG concentrations, but the correlation between them is weak [14]. Parish *et al.* (1997), according to the model they set in the same subject; GGT enzyme levels should be > 200 IU / L on day 1 after colostrum uptake> 100 IU / L on day 4> 75 IU / L at the end of week 1, passive transfer failure of <50 IU / L GGT levels at the end of 2nd week [15] . However, it is noted that this bulge does not occur only in the ice of the colostrum, which is observed on the ice, and is fed with milk or milk substitutes [16].

Serum Total Protein (TP)

Some investigators [17] found that the mortality rates of icebergs with low serum TP values of 50 g / L in the early stages of life were 3 to 6 times higher than those with 60 mg / L of high serum TP concentration. Serum TP levels are not very specific, but above 6 g / dl is considered a sign of adequate passive immunity [1,2,13]. Pekcan *et al.* (2013) found that there was a positive correlation between passive transfer success and GGT enzyme levels in calves receiving enough colostrum and reported that GGT enzyme and TP concentrations were high in high Ig levels [18]. There are other studies that have shown that GGT enzyme levels rise very rapidly [19] and that these elevated levels are higher than adult cattle, as demonstrated by the presence of colostrum by serum protein and serum protein electrophoresis [13,14]. The positive correlation between serum TP and IgG concentrations was determined by McBeath *et al.* [20] in 185 studies with calves. In a more recent study [21], it was reported that 5.2 g / dL of serum TP concentration in normal calves equals 1000 mg / dL IgG concentration, which is greater than 80% accuracy. In another study [10] it is reported that passive transeferricity is the case when this ratio corresponds to 5.5 mg / dL protein equivalence.

As a result; GGT enzyme levels and TP concentrations also provide important information in determining the passive transfer failure as well as measuring the IgG concentrations in newborn calves. Measuring these three parameters at the same time is clear that it will allow us to make more precise decisions about the failure of passive transfer status.

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Correspondence to: Bulent Elitok, Afyon Kocatepe University, Faculty of Veterinary Medicine, Department of Internal Medicine, 03200/Afyonkarahisar-Turkey, E-mail: elitok1969@hotmail.com

Key words: *passive transfer, insufficiency, calves, enzyme, total protein*

Received: April 07, 2018; **Accepted:** April 30, 2018; **Published:** May 03, 2018

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