CRIMSON PUBLISHERS
Wings to the Research

Approaches in Poultry, Dairy & Veterinary Sciences

ISSN: 2576-9162

Mini Review

Acute Phase Proteins in Cattle

Ítalo Câmara de Almeida*

Department of Veterinary and Zootechnics, Brazil

***Corresponding author:** Ítalo Câmara de Almeida, Veterinary Hospital, 29500-000, Alegre-ES, Brazil

Submission: May 01, 2018; **Published:** July 19, 2018

Keywords: Animals; Hyperthermia; Leukocytosis; Plasma levels; Infection; Bloodstream; Aggressive processes; Tissue; Homeostasis; Protein; Microorganisms; Enzymes; Hemoglobin; Haptoglobin; Glycoprotein; Proteinograms; Fibrinogen; Syncytial virus; Blood serum

Abbreviations: APPs: Acute Phase Proteins

Mini Review

The animal's immune system is able to produce elements when it is antigenically challenged, so when there are ongoing infectious andinflammatory processes, the animal's organism develops a set of alterations to these aggressive processes called acute phase response, objectifying eliminate the aggressive agent and tissue repair. The acute phase response, the body's natural immune defense response, is composed of several elements such as hyperthermia, leukocytosis, changes in plasma levels of cortisol and certain types of defense proteins, called Acute Phase Proteins (APPs), [1].

In recent years there has been growing interest in the potential of APPs, since they act as indicators of the presence, stage and time of infection and inflammation. Such proteins are released in large amounts into the bloodstream in response to aggressive processes in an attempt to inhibit tissue damage, isolate and destroy the aggressive agent in order to activate the restitution process for the return of homeostasis. In general, the circulating protein concentrations are related to the intensity of the affections and the extent of the tissue lesions presented by the animal, thus, the quantification of the acute phase proteins can provide important diagnostic information [2,3]. According to the animal species in question, APPs are considered to be more reliable indicators of the systemic immune response to infectious and inflammatory processes, when compared to other variables such as vital parameters (body temperature) and blood tests associated with leukocytosis and neutrophilia, a since these parameters may also arise in situations of stress and use of certain types of medications [4].

The mechanism of stimulation of hepatic production of acute phase proteins is by pro-inflammatory cytokines. The functions of the acute phase positive proteins are considered important in the optimization and immobilization of microorganisms and their products, in the activation of the complement system, in the binding of cellular remnants, such as nuclear fractions in neutralizing enzymes, hemoglobin formation and free radicals, and modulation of the host's immune response. In cattle, APPs can be used as a diagnostic tool in many diseases, such as bovine respiratory syncytial virus, bronchopneumonia, mastitis, bacterial infections, lymphatic neoplasm, leucosis, infectious bovine rhinotracheitis, among others. Thus, acute phase proteins may provide an alternative means of monitoring animal health [4]. Recent investigations indicate that the measurement of APPs in the blood serum or plasma of the animal can be useful for the monitoring and prognosis of diseases [5].

In this context, the measurement of acute phase proteins demonstrates a routine applicability in the future, in order to evaluate animal health and the efficiency of drug treatments [6]. In general, APPs can be classified as negative (when they decrease their concentration during the acute phase response) and positive (when they increase their concentration during response). The major negative PFAs are albumin and transferrin. Among the positive ones are ceruloplasmin, haptoglobin, fibrinogen, C-reactive protein, amyloid A, alpha-1-antitrypsin and the acid glycoprotein [7]. Therefore, the acute phase proteins can perform several functions, such as in the identification of infectious and inflammatory processes, such as endometrites, peritonitis, pneumonia and mastitis [1]. Another applicability attributed to the APPs is the monitoring of animal welfare through protein proteinograms. However, physiological differences due to genotypic and phenotypic influences must be considered to reduce the risks of possible misinterpretation of results [8].

References

1. Ceciliani F, Ceron JJ, Eckersall PD, Sauerwein H (2012) Acute phase proteins in ruminants. J Proteomics 75(14): 4207- 4231.
2. Murata H, Shimada N, Yoshioka M (2004) Current research on acute phase proteins in veterinary diagnosis: an overview. Veterinary J 168(1): 28-40.
3. Petersen H, Nielsen J P, Heegaard PMH (2004) Application of acute phase protein measurements in veterinary clinical chemistry. Vet Res 35(2): 163-187.
4. Jain S, Gautam V, Naseem S (2011) Acute-phase proteins: As diagnostic tool. J Pharm Bioallied Sci 3(1): 118-127.
5. Simplicio, KMMG, Sousa FC, Fagliari JJ, Silva PC (2013) Proteinograma sérico, com ênfase em proteínas de fase aguda, de bovinos sadios e bovinos portadores de enfermidade aguda de ocorrência natural. Arquivo Brasileiro de Medicina Veterinária e Zootecnia 65(5): 1339-1347.
6. Skinner JG (2001) International standardization of acute phase proteins. Vet Clin Pathol 30(1): 2-7.
7. Saut JPE, Samantha Ive Miyashiro, Raquel Fraga e Silva Raimondo, Eduardo Harry Birgel Junior (2009) Influência do período pós-parto no proteinograma de vacas holandesas, obtido através da técnica de eletroforese em gel de poliacrilamida. Ciência Animal Brasileira 244-249.
8. Eckersall PD, Bell R (2010) Acute phase proteins: Biomarkers of infection and inflammation in veterinary medicine. Vet J 185(1): 23-27.