

RESULT OF STUDYING SOME ACUTE PHASE PROTEINS AND CORTISOL IN PREGNANT EWES

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ABSTRACT

One of the specific characteristics of Mongolian livestock is that parturition occurs during the cold winter and spring seasons. Aim of our study is to investigate acute phase proteins (APP) in pregnant ewes during the time of cold temperature stress. According to the study, haptoglobin (Hp) concentration in serum of pregnant ewes was highest in February, as well as high variation of Hp was detected during the remaining months. In addition, alpha -1 acid glycoprotein (α 1AGP) was also highest in February, but decreased gradually in the following months.

Key words: *pregnant ewes, haptoglobin, cortisol, alpha 1 acid glycoprotein, blood serum*

INTRODUCTION

Acute phase reaction is a body response to injury, infection, stress, tumor and inflammation [2, 11]. Proteins which are synthesized in liver as a response to inflammation are called APP and during this reaction, concentration of APP rapidly increase and decrease [10]. Kushner et al. [5] firstly studied APP in human medicine field and reported about the duration of body response to any certain injury and inflammation.

Protein concentration in animal blood is changed due to factors such as infection, inflammation, injury or stress [5]. Proteins are classified into 2 groups due to its concentration (increase or decrease). Moreover, APPs differ from each other in their function and metabolism. Some of them are more responsible for

anti-inflammatory reaction, whereas some are less responsible for that [4].

In normal animal plasma, concentration of APP is low, but it increases 100 or 1000 times due to inflammation. Then it suddenly decreases after 24-48 hours of injury and recovery. Some APPs directly play role in animal's immune reaction, while others have effect of protecting tissue from enzymes secreted by pathogen and phagocytic cells [2].

APPs combine to cell lysates so that pathogen can not use it, but it can be used for metabolism of the host organism [2].

In addition, α 1 acid glycoprotein (α 1AGP) has anti-bacterial and immune effects [1].

After splenectomy in calf, Hp is detected only during the first 3-7 days, while α 1AGP increases during the first 3 days and gradually decreases [12].

Positive APPs are part of innate immunity and associated to various physiologic function of immune system. Some positive APPs including mannose-binding protein, ferritin, ceruloplasmin, serum amyloid A and haptoglobin inhibit microbial growth [9].

MATERIALS AND METHODS

A total of 10 pregnant ewes, which are 4-5 years old were selected for the study from ewes used in this experiment were observed for one month and they were kept under normal feeding in the farm of School of Veterinary Medicine, MULS in Zaisan, Khan-Uul district of UB city. On 15th of each months (Feb, Mar

Hormone analysis: Sheep Cortisol ELISA kit manufactured in China was used for measuring cortisol.

Acute phase proteins analysis: Sheep Haptoglobin ELISA kit and Sheep α 1AGP

RESULT

In February, cortisol concentration in serum of pregnant ewes was 17.3 ± 1.5 ng/ml (Figure 1) and in March, it reached 13.5 ± 2.0 ng/ml. In April, it increased and reached 14.3 ± 1.7 ng/ml.

The hormone concentration in pregnant ewes was relatively higher in February than in March ($p < 0.006$) and April ($p < 0.001$).

Negative APPs decrease during the inflammation. They include albumin, transferrin, transferritin, retinol binding protein, anti-thrombin and transcortin. These proteins are used as inflammation marker and their physiologic function is protecting essential amino acids. In human and veterinary medical practice, they are used as a bio-marker for diagnosis and treatment [9].

So we aimed to study APP and cortisol in Mongolian pregnant ewes.

and April, blood samples were taken from jugular vein of pregnant ewes. The last samples were taken around at 12 pm before 7-10 days of parturition. Concentrations of cortisol, haptoglobin and α 1 acid glycoprotein were measured and compared.

ELISA kit manufactured in China were used for measuring haptoglobin and α 1 acid glycoprotein. All data obtained in this study was analyzed by T- test.

There was no significant difference between cortisol concentration in samples of March and April. As a result of this study, it was observed that the concentration of cortisol reached the highest concentration in February which is a colder period and 1st month of gestation.

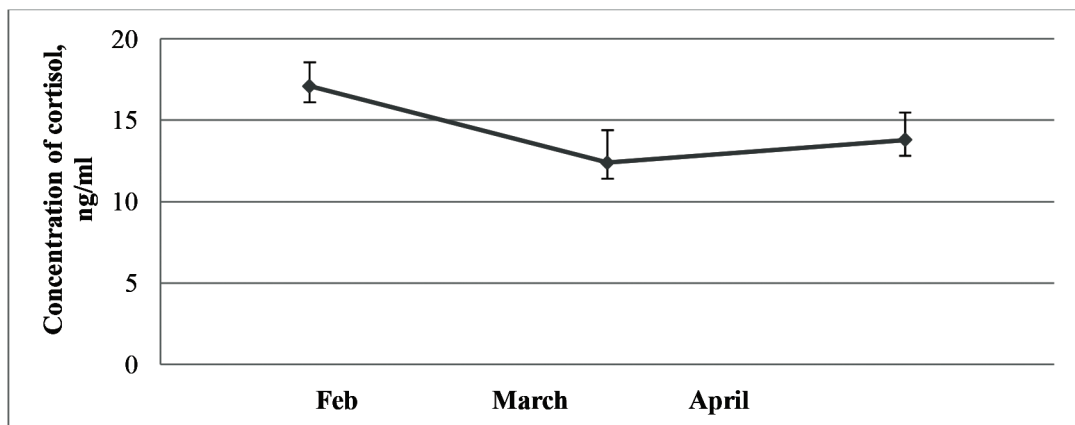


Figure1. Cortisol concentration in serum of pregnant ewes

As a result of measuring Hp in pregnant ewes, it was 18.1 ± 1.1 ng/ml in Feb, but it decreased to 16.9 ± 0.8 ng/ml in March. In the following month, it increased again (Figure 2).

Concentration of Hp was relatively lower in March than in February ($p < 0.005$).

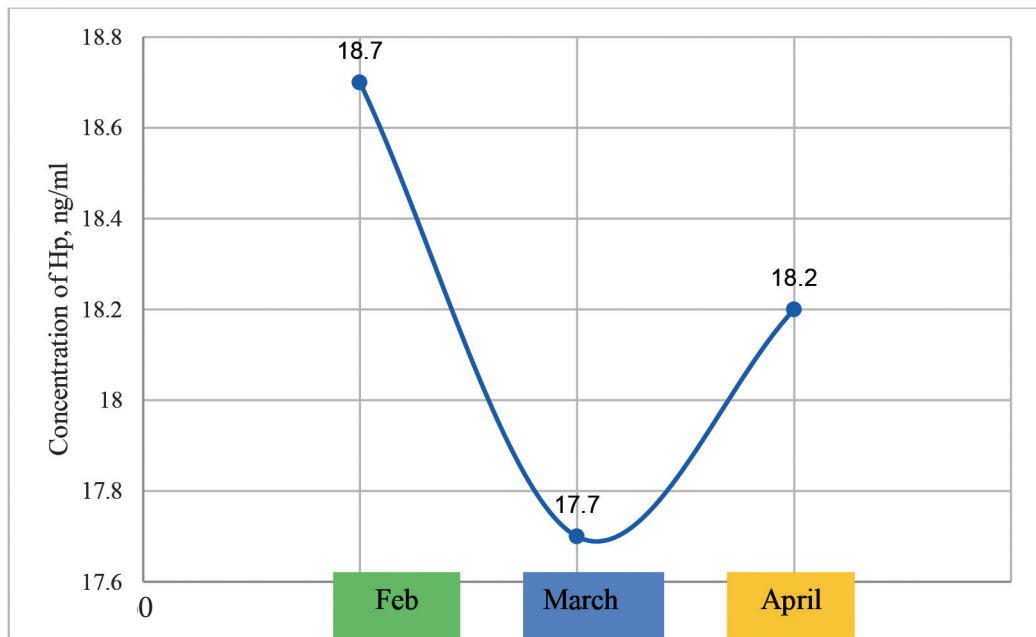


Figure 2. Hp concentration in serum of pregnant ewes

In February, α 1AGP concentration in serum of pregnant ewes was 17.5 ± 1.2 ng/ml, while it was 15.8 ± 1.2 ng/ml in March ($p < 0.027$). Concentration of

α 1AGP constantly decreased during the experiment period. $p < 0.024$; $p < 0.027$).

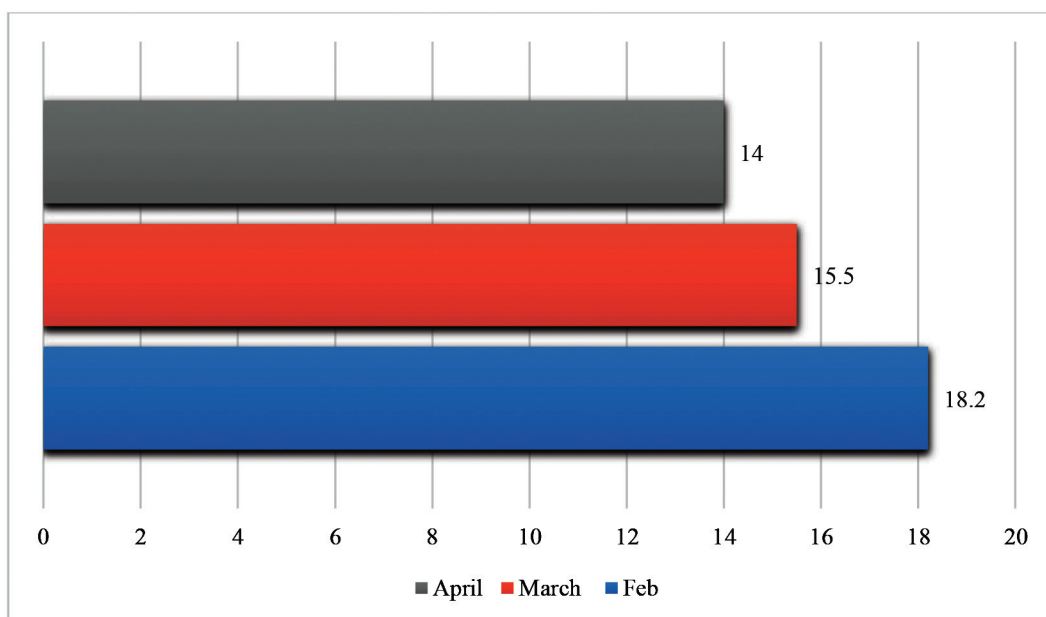
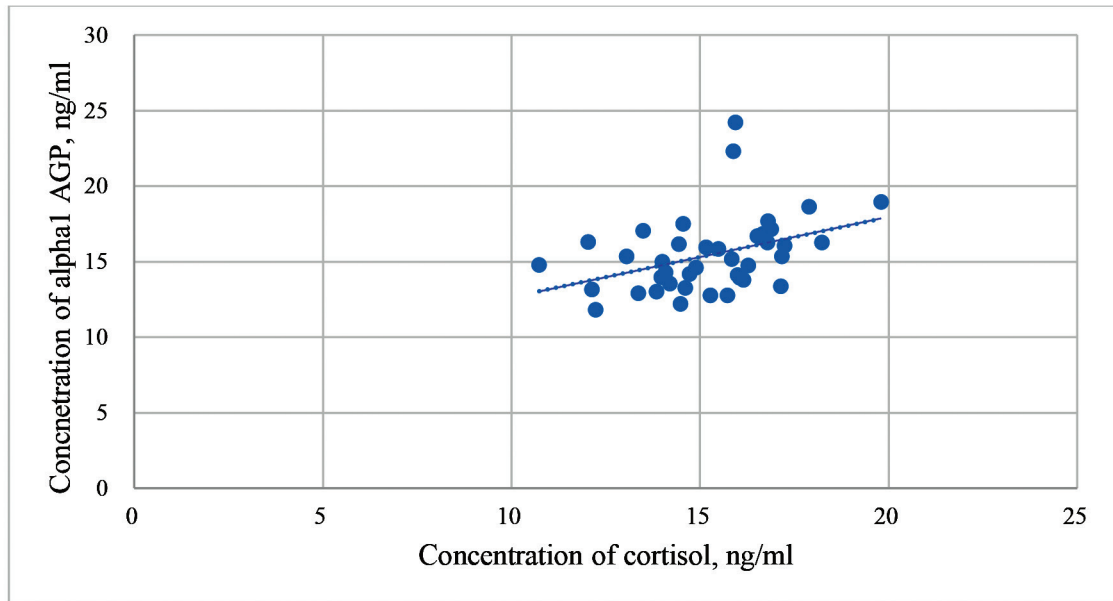
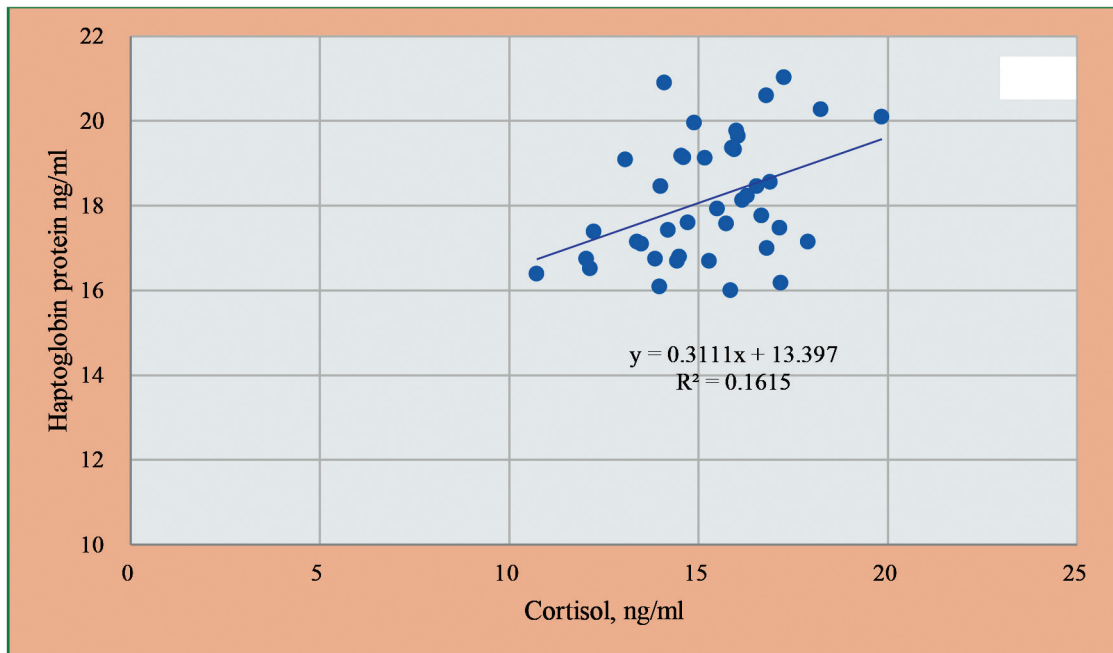


Figure 3. α 1AGP concentration in serum of pregnant ewes

As measured by us in the present study, Hp was the most variably decreasing or increasing protein among APPs in serum of pregnant ewes, while decrease of α 1AGP concentration was stable.

According to our study, it was interesting that cortisol hormone (which increases due to stress), Hp and

α 1AGP concentration were highest in February. Also we analyzed correlation between cortisol and APPs. Positive correlation between cortisol and APPs was determined and shown in figure 3 and 4.

Figure 4. Correlation of cortisol and α 1AGPFigure 5. Correlation of cortisol and Hp and α 1AGP

DISCUSSION

Results of our study demonstrated concentration of cortisol hormone was changeable. According to other studies, concentration of cortisol hormone is lowest in summer, medium in spring and winter, and highest in autumn [4, 9]. Some researchers [3, 6] proved that cortisol concentration in ewes is high in autumn and winter period, and they explained that it is associated to increase of cortisol secretion due to genital organ activity. Our study showed that high concentration of cortisol is linked to cold temperatures around minus 18 to 20°C, which can be stressful to ewes.

Within the frame of our goal, concentration of Hp and α 1AGP which are APPs synthesized in liver due to infectious disease, injury, inflammation and stress [3, 5, 6, 7] were studied. According to our study, serum concentration of Hp in pregnant ewes was highest in February. It could be associated to stress factors such as cooler outside temperature, lack of nutrition and first month of gestation during that period. According to the other study of comparing Hp concentration in pregnant and non-pregnant goat, Hp concentration in pregnant goat was lower than in non-pregnant goat [8].

Hp concentration in healthy pregnant goat could be low due to depression of immune system [6].

During our study period (in cold temperature), serum α 1AGP concentration in pregnant ewes was steadily

decreasing as compared with previous studies ($p < 0.024$; $p < 0.027$).

We should perform further study about acute phase proteins and cortisol in non-pregnant healthy ewes.

CONCLUSION

For period of the study, consecutive detections of cortisol, Hp and AGP were significantly higher in February as compared with those in the remaining two months. Concentration of serum cortisol in

pregnant ewes had positive correlation to the concentration of Hp and α 1AG protein, which reveals alterations of both proteins depend on stress.

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