Study of the effect of testosterone and estradiol on the biochemical parameters of blood in stallions

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Introduction

The aim of the work was to study the relationship of testosterone and estradiol with the biochemical parameters of blood.

Table 1. Stallion sperm quality indicators (n=39).

Indicator	M±SEM
Volume, ml	39,5±3,39
Sperm concentration, million/ml	230,7±12,9
Total number sperm, billion	8,0±0,48
Progressive motility,%	61,3±2,26
The viability at a T +4°C, hour	121,5±5,81
Progressive motility in cryopreserved sperm, %	30,1±2,47
The viability at a T +4°Cin cryopreserved sperm,hour	66,7±4,76

Methods

The blood of 39 stallions aged 3 to 20 years was collected during the breeding season (February-May). Determination of testosterone and estradiol in blood plasma was carried out on a chemiluminescent analyzer Immulite 2000 (Siemens Healthcare Diagnostics Inc., USA). The concentration of HDL and LDL cholesterol and the activity of alkaline phosphatase (ALP) were determined using an automatic biochemical analyzer Vegasys (Analyzer Medical System, Italy), the concentration of total protein, albumins, globulins, glucose, urea, cholesterol, triglycerides, total bilirubin, creatinine, the activity of the enzymes alanine aminotransferase, aspartate aminotransferase, gamma-glutamyltranspeptidase were determined using a biochemical analyzer AU 680 (Beckman Coulter, USA). Spearman's coefficient was used to estimate the rank correlation. Differences were considered statistically significant at $p<0.05$. A significant positive correlation between the concentration of testosterone and the activity of ALP was found ($r=0.34$; $p<0.05$). We found a positive correlation between the concentration of estradiol with the activity of ALP ($r=0.44$; $p<0.01$) and the concentration of HDL cholesterol ($r=0.31$; $p<0.05$), as well as a negative correlation between the concentration of estradiol and glucose ($r=-0.32$; $p<0.05$).

Discussion

We assume that estradiol and testosterone induce the synthesis of alkaline phosphatase through the activation of osteoblastic activity. Estradiol is also able to lower blood glucose level. Among the mechanisms of this phenomenon described in the literature, there is an increase in the expression of GLUT4 and their translocation to the cell membrane, the induction of glycolysis enzymes, the pentose-phosphate cycle and glycogen synthesis. We also assume that estradiol increases HDL cholesterol in the blood by increasing the rate of HDL formation.

Table 2. The concentration of hormones and biochemical indicators in the blood of stallions (n=39).

Indicator	M±SEM
Testosterone, nmol/l	2,0±0,17
Estradiol, pmol/l	199,9±17,13
Total protein, g/l	70,9±1,10
Albumin,g/l	39,7±0,83
Globulins,g/l	30,9±1,21
Glucose,mmol/l	4,1±0,14
Urea,mmol/l	7,5±0,28
Alanine aminotransferase,IU/l	11,6±0,89
Aspartate aminotransferase,IU/l	209,5±13,00
Gamma-glutamyltranspeptidase,IU/l	13,4±1,54
Alkaline phosphatase,IU/l	204,2±12,11
Total bilirubin,mmol/l	35,86±2,37
Creatinine, mmol/l	147,3±4,23
Cholesterol,mmol/l	2,2±0,06
Triglycerides, mmol/l	0,2±0,03
HDL cholesterol,mmol/l	1,5±0,04
LDL cholesterol,mmol/l	0,6±0,03

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