

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Functional Properties Of Anticoagulation And Fibrinolysis In Calves Of Plant Nutrition.

Zavalishina S Yu*.

Russian State Social University, st. V. Pika, 4, Moscow, Russia, 129226.

ABSTRACT

The level of activity of coagulation hemostasis in calves completely converted to the consumption of plant feed can be considered one of the key stages in the maturation of hemostasis mechanisms in the postnatal period. Adequate functioning of the blood coagulation system largely provides the necessary level of adaptation of the calf to the external environment, supporting the rheological properties of blood, contributing to the necessary trophism of tissues, helping to optimize the development of the genetic program for its growth and development. In many respects, these processes are based on the optimal activity of the anticoagulant and fibrinolytic systems in calves in the phase of plant nutrition, which control the intensity of fibrinogenesis during coagulation, the state of which has not yet been studied sufficiently. It was found out that in calves of the optimal physiological status at the age of 3-12 months there was a slight increase in the functional activity of anticoagulation and fibrinolysis systems of blood plasma. This provides them with the optimal blood rheology necessary for the growth and development of the body. An increase in the activity of anticoagulation and fibrinolysis in the blood of calves at this age allows their growing animal to adapt adequately to the vegetative composition of the forages, ensuring the final maturation of their tissues and organs.

Keywords: phase of a vegetative feed, anticoagulative of blood, fibrinolysis, calves, lipid peroxidation.

**Corresponding author*

INTRODUCTION

The acute need of modern society for stable development can be met only if there is sufficient quantity of quality food [1,2,3]. This problem in many countries can be solved by intensifying livestock [4], which is a stable supplier of milk and meat. This process is possible only on a solid scientific basis, based on the latest physiological data on large cattle of different ages [5].

An important body system, which should be studied for enriching practical biology, is blood [6,7]. Its mechanisms of maintenance in a liquid state are extremely important for realization of ability to live of calves and cows [8]. In addition, these mechanisms, with a competent impact on them after a detailed study, can ensure the growth of calves' productivity [9,10].

The formation of coagulation hemostasis in calves completely converted to vegetable feed can be considered one of the key stages of the maturation of mechanisms of hemostasis in the postnatal period [11,12]. Adequate functioning of the blood coagulation system largely provides the necessary level of calf adaptation to the external environment, supporting the rheological properties of the blood, contributing to the necessary trophism of tissues, helping to optimize the development of the genetic program of calf growth and development [13,14]. In many respects, these processes are based on the optimal activity of the anticoagulant and fibrinolytic systems in calves in the phase of plant nutrition, which control the intensity of fibrinogenesis during coagulation, the state of which has not yet been studied sufficiently [15,16].

In this regard, the goal of the study is to determine the physiological state of the anticoagulation and fibrinolysis systems in healthy calves in the phase of plant nutrition.

MATERIALS AND METHODS

Research was conducted in strict accordance with ethical principles established by the European Convent on protection of the vertebrata used for experimental and other scientific purposes (adopted in Strasbourg March 18, 1986, and confirmed in Strasbourg June 15, 2006) and approved by the local ethic committee of Russian State Social University (Record №12 dated December 3, 2015).

The study included 39 healthy calves of plant nutrition, taken under observation on 91 days of life. The complex of examinations consisted of determining the activity of peroxide oxidation of plasma lipids by the content of acyl hydroperoxides, thiobarbituric acid-active products by the Agat-Med company (Russia) and the antioxidant activity of the liquid part of the blood. Each calf evaluated the condition of the anticoagulant system of blood plasma by determining the activity of antithrombin III and protein C in plasma.

To determine the level of fibrinolytic ability of blood plasma in calves, a method was used to determine the time of spontaneous euglobulin lysis, the activity of plasminogen, α_2 antiplasmin, and the content of fibrin degradation products with the phenanthroline method.

Healthy calves were examined during the phase of plant nutrition four times: 91 days, 6 months, 9 months and 12 months of life.

Statistical processing of the results was carried out using Student's t-test.

RESULTS OF THE STUDY

During the phase of plant nutrition in healthy calves, there was a gradual increase in the level of antioxidant plasma activity to 34.7% -0.07% by 6 months. with the subsequent its additional increase to 36.5±0.10% to 12 months. life. This led to a decrease in the level of primary products of lipid peroxidation - acyl hydroperoxides: by 6 months up to 1.33±0.07 D₂₃₃/1 ml and up to 1.21±0.14 D₂₃₃/1 ml to 12 months of life. This was accompanied by a similar dynamics of the content of secondary products of free radical lipid oxidation - thiobarbituric acid-active compounds by 6 months 3.36±0.12 μmol/l, by 12 months 3.18±0.12 μmol/l, which turned out to be lower than the values typical for thiobarbituric acid products at the beginning of the phase of plant nutrition by 7.9%.

In the dynamics of the activity of the anticoagulant and fibrinolytic ability of the blood of calves at the age between 3 and 12 months, a statistically significant regularity was found (table). Thus, in the examined healthy calves of plant nutrition, a significant increase in the blood level of antithrombin III to 6 months of life to $123.1 \pm 0.11\%$ was found. At the same time, an increase in the activity of the protein C level to $97.3 \pm 0.14\%$ was observed at this age. In the subsequent, by 12 months of life, the activity of the anticoagulants was additionally reliably increased.

Table. Anticoagulation and fibrinolytic activity blood in healthy calves of plant nutrition

Registered parameters	Phase of plant nutrition, n=39, M±m			
	91 day of life	6 months of life	9 months of life	12 months of life
The activity of antithrombin III in plasma, %	120.1±0.07	123.1±0.11 p<0.01	126.4±0.05 p<0.01	129.0±0.07 p<0.01
Protein C, %	94.0±0.15	97.3±0.14 p<0.01	99.7±0.08 p<0.01	104.6±0.06 p<0.01
Time of spontaneous euglobulin lysis, minutes	161.7±0.20	155.1±0.14 p<0.05	150.7±0.16 p<0.05	145.1±0.10 p<0.05
Plasminogen, %	132.8±0.10	135.2±0.06 p<0.05	138.7±0.13 p<0.05	142.5±0.07 p<0.05
α ₂ antiplasmin, %	89.2±0.10	93.6±0.12 p<0.05	96.7±0.06 p<0.05	99.6±0.09 p<0.05
Fibrin degradation products, µg / ml	44.3±0.15	45.2±0.22	46.0±0.18	45.7±0.17

Legend: p - reliability of the dynamics of the estimated indicators in calves of plant nutrition.

The switch to vegetable nutrition in healthy calves contributed to a similar dynamics of the level of plasminogen with a significant decrease in the inhibitor of its active form - α₂ antiplasmin by 4.9% to 6 months life, followed by an additional similar dynamics of their activity, which ensured the acceleration of the fibrinolysis process, estimated from the time of spontaneous euglobulin lysis from 11 to 11 months by 3 to 12 months. In the estimated age period, a constant concentration in the blood of fibrin degradation products was recorded, which indicated an optimal level of adaptation of the organism to the external environment by maintaining fibrinolysis activity at the required level.

Thus, from 3 to 12 months of life in calves of plant nutrition, a significant increase in plasma levels of antithrombin III, plasminogen, protein C and a decrease in α₂ antiplasmin, which is undoubtedly an important element in the adaptation of animals to new nutritional conditions, contributes to the transition of their hemostasis to the level required for the further growth and development of the body.

DISCUSSION

The study made it possible to reveal that a small but reliable gradual decrease in the intensity of lipid peroxidation is observed in healthy calves of plant nutrition [17] due to an increase in the functional readiness of the antioxidant protection of plasma [18,19] during the first 9 months. of this phase of relativeogenesis with a steady increase in the activity of anticoagulation and fibrinolysis, which undoubtedly allows the calf to adapt to new nutritional conditions [20], providing a normal rheological state of the blood [21,22], and thereby the necessary inflow of nutrients [23] and oxygen to its developing tissues [24,25]. Obviously, this is an important element of the reaction of the calves' organism during their free feeding with plant foods containing a large number of biologically active substances [26]. These components of feed are by their properties strong adaptogens and antioxidants [27], which positively affect their organism and ensure its formation at the beginning of the phase of plant nutrition [28,29]. An increase in the activity of the anticoagulation system, which controls the aggregate state of blood and the fibrinolysis system [30], which dissolves excess fibrin, is largely due to the weakening of lipid peroxidation and the coagulation system [31], causing their adequate

readiness to respond to environmental factors [32,33]. So, during the first 9 months. phase of plant nutrition significantly increases the activity of inhibitors of coagulation [34] and the level of fibrinolytics: antithrombin III, protein C and plasminogen increase with decreasing function of fibrinolysis inhibitor- α 2 antiplasmin [35,36]. Obviously, this is an element of the physiological response of adaptation of the organism in the conditions of plant nutrition. Along with this, there is a gradual increase in the general inhibitor of contact activation of plasma proteases - plasminogen, accompanied by the preservation of a stably low level of fibrin degradation products in the blood [37]. This indicates the maintenance of a state of stable adaptation of the functioning of hemostasis maintenance mechanisms under these conditions [38] without signs of hypocoagulation of hemostasis, ensuring optimal microcirculation and the degree of perfusion of internal organs [39], which largely maintains the necessary level of metabolism in calf tissues [40], contributing to its further growth and development.

Thus, the calves of plant nutrition show a significant increase in the activity of anticoagulation and fibrinolysis of the plasma, which is undoubtedly an important part of the overall adaptation process of the organism in early ontogeny.

CONCLUSION

In healthy calves of 3-12 months of age, there is a small but significant increase in the functional activity of the anticoagulation and fibrinolysis systems of the blood plasma, thereby ensuring the optimal rheology necessary for growth and development of the body. The increased activity of anticoagulation and fibrinolysis in the blood allows the growing animal to adapt adequately to vegetative nutrition, ensuring the final maturation of tissues and organs.

REFERENCES

- [1] Apanasyuk LA, Soldatov AA. (2017) Socio-Psychological Conditions for Optimizing Intercultural Interaction in the Educational Space of the University. *Scientific Notes of Russian State Social University*. 16(5-144) : 143-150. doi: 10.17922/2071-5323- 2017-16-5-143-150.
- [2] Maloletko AN, Yudina TN.(2017) (Un)Making Europe: Capitalism, Solidarities, Subjectivities. *Contemporary problems of social work*. 3 (3-11) : 4-5.
- [3] Pozdnyakova ML, Soldatov AA. (2017) The Essential and Forms of the Approaches to Control the Documents Execution. 3 (1-9): 39-46. doi: 10.17922/2412-5466-2017-3-1-39-46.
- [4] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological Indices of Platelet-Coagulation Hemostasis in Purebred Irishire Cows in The Course of Lactation. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 419-426.
- [5] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological features of platelet aggregation in calves of Ayrshire breed during the phase of plant nutrition. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(2) : 1008-1013.
- [6] Bikbulatova AA, Andreeva EG, Medvedev IN. (2018) Hematological Features Of Patients With Osteochondrosis Of The Spine. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(3) : 1089-1095.
- [7] Bikbulatova AA, Karplyuk AV, Medvedev IN. (2018) The Problem Of Vocational Guidance Work With Young People, Who Have Limited Health Opportunities In Modern Russia. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(4) : 586-590.
- [8] Oshurkova JuL, Medvedev IN, Tkacheva ES. (2018) Functional Features Of Platelet Aggregation In Heifers Of The Ayrshire Breed, Which Are Being Prepared For Insemination. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(3) : 1155-1160.
- [9] Bikbulatova AA, Karplyuk AA, Parshin GN, Dzhabfar-Zade DA, Serebryakov AG. (2018) Technique for Measuring Vocational Interests and Inclinations in High-School Students with Disabilities. *Psikhologicheskaya nauka i obrazovanie-psychological science and education*. 23(2) : 50-58. doi: 10.17759/pse.2018230206
- [10] Medvedev IN. (2018) Peculiarities of vascular control over platelet aggregation in patients with Arterial hypertension of the 3rd degree at metabolic syndrome. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(1) : 258-264.
- [11] Medvedev IN. (2018) Functional Peculiarities Of Platelet Activity In Persons With Arterial Hypertension Of The High Degree Developing Against The Background Ofhypodynamia At Metabolic Syndrome. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 9(1) : 308-314.

- [12] Medvedev IN. (2018) Development of Platelet Dysfunctions at Arterial Hypertension with Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 439-444.
- [13] Medvedev IN. (2018) Physiological Reaction of Erythrocytes' Microrheological Properties in Persons of The Second Mature Age on Prolonged Hypodynamia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 577-582.
- [14] Medvedev IN. (2018) Activity of Platelets' Aggregation in Patients of The Second Mature Age with Arterial Hypertension of The 3rd degree. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 651-656.
- [15] Medvedev IN. (2018) Disaggregating Vascular Impacts on Platelets in Patients with Arterial Hypertension Of The 3rd Degree. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 663-669.
- [16] Medvedev IN. (2018) Physiological Peculiarities of Erythrocytes' Aggregation in Rats Of Elder Ages. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 716-721.
- [17] Medvedev IN. (2018) Physiological Dynamics of Erythrocytes' Cytoarchitecture In Aged Rats. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 736-740.
- [18] Medvedev IN. (2018) Dis Aggregative Capabilities of Vascular Wall in Respect of Erythrocytes in Patients with Arterial Hypertension and Dislipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 811-816.
- [19] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological Peculiarities of Platelet-Coagulative Hemostasis in Dead-Wood Cows of Irishire Breed. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 817-822.
- [20] Medvedev IN. (2018) Disaggregative Impacts of Vascular Wall on Platelets of Patients with Arterial Hypertension and Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 857-863.
- [21] Medvedev IN. (2018) Vascular Disaggregative Control Over Neutrophils In Patients With Arterial Hypertension And Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 864-869.
- [22] Medvedev IN. (2018) Aggregation of Thrombocytes in People of Second Adulthood with Arterial Hypertension of the 2 Rd Degree. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(1) : 870-875.
- [23] Medvedev IN. (2018) Correction of the image of the physical "I" in people with disabilities with hemiparesis who underwent a hemorrhagic stroke. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2): 697-704.
- [24] Medvedev IN. (2018) Adaptive Resource Of Disabled Persons With Hemiparesis Who Underwent Hemorrhagic Stroke. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 957-964.
- [25] Medvedev IN. (2018) Vasopathy In Patients With Arterial Hypertension 2 Degrees. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 965-971.
- [26] Vorobyeva NV, Mal GS, Skripleva EV, Skriplev AV, Skoblikova TV. (2018) The Combined Impact of Amlodipin And Regular Physical Exercises On Platelet And Inflammatory Markers In Patients With Arterial Hypertension. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(4) : 1186-1192.
- [27] Medvedev IN. (2018) Signs Of The Development Of Vasopathy In Arterial Hypertension 1 Degree. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 984-990.
- [28] Makhov AS, Medvedev IN. (2018) The Ability to Reduce the Severity of Motor Disorders in Children With Cerebral Palsy. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 991-996.
- [29] Oshurkova JuL, Medvedev IN, Fomina LL. (2018) Physiological features of platelet aggregation in calves of Ayrshire breed during the phase of plant nutrition. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1008-1013.
- [30] Makhov AS, Medvedev IN. (2018) General improvement of children with Down syndrome by means of regular soccer lessons. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1014-1019.
- [31] Medvedev IN. (2018) Vascular disaggregation effects on erythrocytes in patients with arterial hypertension with abdominal obesity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1025-1029.

- [32] Medvedev IN. (2018) Severity of disaggregation control of blood vessels over platelets in patients with arterial hypertension with abdominal obesity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1030-1035.
- [33] Medvedev IN. (2018) The state of vascular disaggregation effects on neutrophils in patients with arterial hypertension with abdominal obesity. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1036-1041.
- [34] Medvedev IN. (2018) Physiological parameters of erythrocytes against the background of regular exercise in the model conditions. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1042-1047.
- [35] Medvedev IN. (2018) Functional Features of Erythrocytes In The Scoliotic Process. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1048-1052.
- [36] Medvedev IN. (2018) Physiological Features Of Platelet Aggregation In Aging Mammals Against The Background Of Physical Exertion. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1053-1057.
- [37] Medvedev IN. (2018) Physiological Activity Of Platelets In Vivo During Aging Against The Background Of Physical Exertion. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1058-1062.
- [38] Medvedev IN. (2018) Physiological Features Of Erythrocytes In Rats At Late Stages Of Ontogenesis. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1063-1068.
- [39] Makhov AS, Medvedev IN. (2018) Correction Of Asthenia In Football Players With Down Syndrome. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 1161-1166.
- [40] Skorjatina IA. (2018) Therapeutic Possibilities Of Rosuvastatin In The Medical Complex In Relation To Disaggregation Vascular Control Over Erythrocytes In Persons With Arterial Hypertension And Dyslipidemia. Research Journal of Pharmaceutical, Biological and Chemical Sciences. 9(2) : 977-983.