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Antioxidant protection and peroxydation lipid of body cows of high calves for the prevention of salmonella under the influence of nanpreparation Germakap

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The article deals with the results of experimental research data of relationship between the antioxidant defense system and lipid body peroxydation of high calves cows under the influence of nanpreparation Germakap conducted with simultaneous vaccination with inactivated formol vaccination with repeated in two weeks later at the same doses as their stability and immunity to Salmonella. It was found the likely increase in activity of glutathione peroxidase and glutathione reductase and at the same time, reduction of malon dialdehyde and hydroperoxides lipids and superoxidimutase. These changes in animals body occur due to complex components adaptive nan preparation Germakap that lead to the normalization of metabolic and free radical processes in animals. However, the increase in the catalytic activity of glutathione peroxidase and glutathione reductase activity in plasma of high calves cows from research group can be explained by increasing intensity of synthesis in which these enzymes by introducing nan preparation Germakap closely associated with the regeneration of glutathione in the cell, and also the activity of glutathione peroxidase. Through interaction with restoration of glutathione and glutathione peroxidase, glutathione reductase it was formed glutathione system that protects cells from stress peroxydation

Key words: cows, antioxidant system, lipid peroxidation (lipid peroxydation), malonic dialdehyde, superoxide dismutase, glutathione peroxidase, glutathione reductase, salmonellosis, nan preparation Germakap.

Антиоксидантний захист та перокисне окиснення ліпідів організму високотільних корів при профілактиці сальмонельозу за впливу нанопрепарату Гермакапу

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У статті приведено дані результату експериментального дослідження взаємозалежності між антиоксидантною системою захисту та перокисним окисненням ліпідів організму високотільних корів за впливу нанопрепарату Гермакапу з одночасною проведеною вакцинацією інактивованою формолгалуневою вакциною із повторною ревакцинацією через два тижні у тій самій дозі та станом стійкості імунітету у них до сальмонельозу. При цьому виявлено вірогідне підвищення активності глутатіонпероксидази і глутатіонредуктази, а заодно, зниження вмісту малонового діальдегіду і гідроперексидів ліпідів та супероксидисмутази. Дані зміни в організмі тварин відбуваються завдяки комплексній адаптивній дії складників нанопрепарату Гермакапу, які призводять до нормалізації метаболічних та вільнорадикальних процесів в організмі тварин. Однак, зростання каталітичної активності глутатіонпероксидази та активності глутатіонредуктази в плазмі крові високотільних корів дослідної групи можна пояснити зростанням інтенсивності синтезу в них даних ферментів завдяки введенню нанопрепарату Гермакапу, що тісно пов'язано з регенерацією глутатіону в клітині, а також самою

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активністю глутатіонпероксидази. Через взаємодію відновленого глутатіону з глутатіонпероксидазою і глутатіонредуктазою утворюється глутатіонова система, що захищає клітини від пероксидного стресу

Ключові слова: корови, антиоксидантна система, ПОЛ (пероксидне окиснення ліпідів), малоновий діальдегід, супероксиддисмутаза, глутатіонпероксидаза, глутатіонредуктаза, сальмонельоз, нанопрепарат Гермакап.

Антиоксидантная защита и пероксидное окисления липидов организма высококостельных коров при профилактике сальмонеллеза за влияния нанопрепарата Гермакапа

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В статье приведены данные результата экспериментального исследования взаимозависимости между антиоксидантной системой защиты и пероксидным окиснением липидов организма высококостельных коров за влияния нанопрепарату Гермакапу с одновременной проведенной вакцинацией инактивированной формолгалуневой вакциной с повторной ревакцинацией через две недели в той же дозе и состоянием устойчивости иммунитета у них к сальмонеллезу.

При этом выявлено достоверное повышение активности глутатионпероксидазы и глутатионредуктазы, а заодно, снижения содержания малонового диальдегида и гидроперекисей липидов и супероксиддисмутази. Данные изменения в организме животных происходят благодаря комплексному адаптивному действию составляющих нанопрепарату Гермакапу, которые приводят к нормализации метаболических и свободнорадикальных процессов в организме животных. Однако, рост каталитической активности глутатионпероксидазы и активности глутатионредуктазы в плазме крови высококостельных коров опытной группы можно объяснить ростом интенсивности синтеза в них данных ферментов благодаря введению нанопрепарату Гермакапу, что тесно связано с регенерацией глутатиона в клетке, а также самой активностью глутатионпероксидазы. Через взаимодействие восстановленного глутатиона с глутатионпероксидазой и глутатионредуктазой образуется глутатионова система, что защищает клетки от пероксидного стресса

Ключевые слова: коровы, антиоксидантная система, ПОЛ (пероксидное окисления липидов), малоновый диальдегид, супероксиддисмутаза, глутатионпероксидаза, глутатионредуктаза, сальмонеллез, нанопрепарат Гермакап.

Introduction

Currently, the agricultural sector of Ukraine is the issue of increasing the production of animal products, namely milk and meat from improving their quality and safety. The fact should not be forgotten that infectious diseases of farm animals and reduce the productivity of the industry significantly increase production costs. However, an important role in preventing the emergence and development of inflammation in infectious diseases plays a strengthening process of free radical oxidation. At the same time opposed to this process exists antioxidant protection, namely the system of antioxidant enzymes and natural antioxidants (Lavriv, 2011; Tiutiun, 2011; Gutyj, 2013; Gutyj, 2015; Avdos'yeva et al., 2015; Martyshuk et al., 2016).

Because the question of finding new and effective ways to prevent salmonellosis is the most important in modern veterinary medicine. Development and implementation nan preparation Germakap that based on modern nanotechnology with cheap, affordable source of micronutrients, based nano carboxylates germanium, zinc and silver are priorities as they do not cause the adaptation by pathogenic microorganisms not accumulate in tissues and organs, do not give side effects and are not harmful to the animals and the environment (Lebr and Mazerol, 2009; Avdos'yeva et al., 2015).

The purpose and objectives of the study. The aim of this work was to study the role of the new nano preparation of Germakap in the prevention of salmonellosis of

highcalves cows and increase antioxidant protection and lipid peroxidation in their body for his actions.

The purpose of the work was to study the influence no preparation Germakap together with vaccination against salmonella in antioxidant protection and lipid peroxidation in their body and on the growth and survival of calves in economic conditions.

Material and methods

Research for the study no preparation Germakap conducted in terms of agricultural production cooperative Mykhailo Grushevskiy (St. Number 20536228), Rohatyn district, Ivano-Frankivsk region for cattle, black and white breed, age 3 – 5 years. After a clinical examination was formed two groups of cows over 10 goals each, two months before the birth. Cow as the first control, so the second experimental group for 50 – 60 days for delivery was administered intramuscularly at a dose of 10,0 cm³ and repeated after 8 – 10 days at a dose of 15 cm³ formolgalunic inactivated vaccine, and in addition to cows while the second group was injected y the muscle nano-preparation Germakap at a dose of 5,0 cm³ down at intervals of 8 – 10 days.

The material of the study was the blood that were taken from cows under nail artery at baseline 2 days after the formation of groups 10 days after intramuscular nano preparation and vaccination and 30 days after the first injection,

Blood plasma was determined according to the procedures:

- The number of red blood cells – by counting chamber Goryaeva;
- The concentration of hemoglobin – the method of Sali;
- Morpho-functional and antioxidant body condition of cows and calves before and after injection of these drugs is determination of hydroperoxides lipids, malondialdehyde (MDA), superoxide dismutase activity and the activity of glutathione and the activity of glutathione reductase assessed by morphological and specific antioxidant and immunological parameters of blood, which determined in accordance with conventional methods (Vlizlo et al., 2012).

The results were treated statistically using standard computer programs. The difference between the two values considered probable by: $P < 005$; $P < 001$; $P < 0001$.

Results and discussion

Analysis of the results of our studies show that the use of the time and for the period Germakap study overall clinical condition high calves cows and calves in both groups after both the control and experimental remained satisfactory and no different adverse reactions manifested. However, calves research groups use nanpreparation Germakap led to a significant improvement in appetite, coat became shiny, significantly increased their activity and increases reach to 756 – 845 grams of live weight per day. At the same time, analysis of laboratory tests of blood from cows Below Table 1 indicates that the experimental group of cows on the 30th day after administration is nanpreparation Germakap reduction of red blood cells from the top to the bottom of the physiological norm at 7.02%, and therefore to the control group to 5.36%. It was also notes among research groups at the end of the

experiment, hemoglobin was decreased by 2.54%, as compared to the control decline was 1.71%.

At the same time, the analysis of the study showed that the concentration of lipid hydroperoxides on the 30th day of the experiment, the experimental group significantly decreased by 35.63% ($P < 0001$), as compared to 32.62% in the control ($P < 0001$). It is noted also possible decline at the end of the experiment, the experimental group malondialdehyde concentration to 39.59% ($P < 0001$) and relative control group it is 37.48% ($P < 0001$). If we analyze the activity of superoxide dismutase it is necessary to note the possible decline of the research group at the end of the experiment to 20.13% ($P < 0001$) and in accordance with the control group is also likely to decrease 18.54% ($P < 0001$).

On one side are not changes in the activity of glutathione peroxidase and glutathione reductase. Thus, among the experimental group at the end of the experiment is likely to increase the activity of glutathione peroxidase 37.07% ($P < 0001$) and relative control group significant increase of 32.49% ($P < 0001$). At the same time, at the end of the experiment is significant increase glutathione reductase activity among the experimental group 1.9 times ($P < 0001$) and in accordance with the control group 1.7 times ($P < 0001$). It was also notes the significant increase of serum complementary activities among research groups at the end of the experiment and in accordance with the control group 1.7 times ($P < 0001$).

Thus, our results confirm that the introduction of this drug of high calves cows in them is likely lowering lipid hydroperoxides and malondialdehyde and significant increase in plasma activity of glutathione peroxidase and glutathione reductase, which confirms its impact on the activity of antioxidant system in their body.

Table 1

Biochemical parameters of blood vysokotilnyh cows Ukrainian black and white dairy breed ($M \pm m$), $n = 10$

Indicators	Group of cows			
	Research		Control	
	End Start experiment	End of experience	Beginning of experience	End of experience
Red blood cells, 12 / L	5.7 ± 0.5	5.3 ± 0.3	5.7 ± 0.4	5.6 ± 0.5
Haemoglobin, gramm/l	106.4 ± 5.1	103.7 ± 3.4	106.3 ± 5.8	105.5 ± 4.3
The concentration of hydroperoxides lipid od.E 480 / ml odes.E 480/мл	5.36 ± 0.05	3.45 ± 0.03***	5.35 ± 0.06	5.12 ± 0.04
The concentration of malonic dialdehyde, nmol / ml	6.82 ± 0.07	4.12 ± 0.04***	6.76 ± 0.07	6.59 ± 0.06
Act. Superoxidedysmutazy, um.od / mg protein	1.54 ± 0.8	1.23 ± 0.5***	1.55 ± 0.8	1.51 ± 0.7
Act. Glutathione peroxidase, mmol GSH / min. mg protein	21.42 ± 0.41	29.36 ± 0.49***	21.45 ± 0.42	22.16 ± 0.43
Akt.hlutationredukcijos, nmol NADH + / min • mg protein squirrel	0.39 ± 0.07	0.75 ± 0.09***	0.38 ± 0.07	0.44 ± 0.08
Complementive act. Cheese, blood from	0.03±0.003	0.05±0.004	0.03±0.003	0.03±0.003

Note: *– $P < 005$; **– $R < 001$; ***– $R < 0001$.

However, it should be noted that the active protection of cows involving natural resistance mechanisms are often not effective due to the spread of metabolic abnor-

mities, among which an important place is a violation of the imbalance of free radical processes including lipid peroxidation and reduced antioxidant systems. However,

free-radical processes (GRP) – a necessary element of any inflammation associated with phagocytes production of reactive oxygen species (ROS).

Produced secretory function of phagocytes in the evolution needed to kill bacteria, but a sharp increase in oxygen consumption during phagocytosis sometimes results in changing the restoration of O₂ to H₂O in leukocytes, which mainly generate ROS. However, excess ROS initiates free radical lipid peroxidation (LPO) that damage tissues primarily biological membranes. The emergence of a large number of free radicals penalized in the mitochondrial electron transport chain; separation of oxidative phosphorylation under POL leads to a deep deficit of energy; changing the function of enzymes, carbohydrates and proteins, including proteins DNA and RNA. As a result of this, cell lost regulatory functions, abnormal proteins are appeared and are stimulated, besides the direct damaging actions, secondary destructive processes. Originating deep breach the membrane and the next – a total architectonics cell leads to its death that oxidative stress. It was also noted that a significant role in the ethiopathogenesis play salmonella bacterial flora, which is closely linked to the activity of free radicals and immune responses, GRP is one of the parts of the course and salmonella.

Conclusions

The analysis of data obtained by us in the study, suggest stimulating effect of nanopreparation Germakap not only on the activity of the immune system in the body of high calves cows, but also on the activity of antioxidant system, which explains its effect on the function of antioxidant system, aimed at the disposal of toxic products of free radical oxidation and maintain bioradical physiological balance in the prevention of salmonellosis (Lebr and Mazerol, 2009; Tiutiun, 2011; Avdos'yeva et al., 2015).

References

- Avdos'yeva, I.K., Kaplunenko, V.H., Pashchenko, A.H. (2015). Perspektyvy vykorystannya zdostrukiv nanotekhnolohiy u veterynarniy praktytisi. Tvarynytstvo S'ohodni. 7, 52 – 56 (in Ukrainian).
- Gutyj, B.V. (2013). Riven' pokaznykiv nefermentnoi' systemy antyoksydantnogo zahystu organizmu bychkiv za umov kadmijevogo navantazhennja. Naukovyj visnyk L'vivs'kogo nacional'nogo universytetu veterynarnoi' medycyny ta biotekhnologij im. G'zhyc'kogo. 15, 1(4), 40–45 (in Ukrainian).
- Gutyj, B.V. (2015). Aktyvnist' systemy antyoksydantnogo zahystu organizmu bychkiv za gostrogo kadmijevogo toksykozu. Naukovyj visnyk L'vivs'kogo nacional'nogo universytetu veterynarnoi' medycyny ta biotekhnologij im. G'zhyc'kogo. 17, 1(1), 31–36 (in Ukrainian).
- Lavriv, P.Y. (2011). Modern views on imunologic reactivity of goug cattle at salmonellosis. Cattlebreeding Ukraine. 6, 15 –19.
- Lebr, M., Mazerol, P. (2009). Orhanic connections of germany. Moscow: Mir, 124 – 136.
- Martyshuk, T.V., Gutyj, B.V., Vishchur, O.I. (2016). Level of lipid peroxidation products in the blood of rats under the influence of oxidative stress and under the action of liposomal preparation of «Butaselmavit», Biological Bulletin of Bogdan Chmelnytsky Melitopol State Pedagogical University. 6(2), 22–27.
- Tiutiun, V.A. (2011). Influence of nanopreparation on metabolic processes in microorganism. Veterinary Biotechnolog. Bull. 19, 195 – 201.
- Vlizlo, V.V., Fedoruk, R.S., Ratyck, I.B. (2012). Laboratory method of search in biology, veterinary medicine, directory. Lviv, Spolom

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