Detoxifying Gel
EnteroZoo®

# Scientific document


www.enterozoo.eu

Detoxication gel
EnteroZOO®

The EnteroZOO detoxifying gel is an enterosorbent containing an organosilicon compound (Polymethylsiloxane polyhydrate) and water. EnteroZOO works as an „intelligent" sponge, it has high binding preference for toxic molecules, pathogens, allergens and very low capacity for useful substances. Therefore, useful substances will not be adsorbed by EnteroZOO.

EnteroZOO for pets and farm animals can bind various noxious substances and toxins so as to detoxify the body, whatever the origin of the toxins, and to improve the animal's condition very fast. It thus encourages the growth of normal intestinal flora and restores the animal's intestinal immunity. After its function has been performed, it is eliminated from the body, together with any bound toxins.

## EnteroZOO can be used in the following conditions:

- Acute diarrhoea
- Chronic diarrhoea
- Indigestion (dyspepsia)
- Disturbed intestinal flora (e.g., due to taking antibiotics)
- Poisoning
- Chronic hepatic or liver disease/failure
- Allergies
- Skin conditions
- Prevention of intoxication

## How should the product be used?

Using EnteroZOO is very easy. As it is tasteless and odourless, it can be easily administered directly into the animal's mouth, added to food or treat, or administered in the form of water solution.

It is generally well accepted by all animals. The recommended dosage depends on animal species and the weight of your pet: for details, see the package leaflet.

## Where can you buy EnteroZOO?

You can buy EnteroZOO directly in our e-shop, but also at our partners - either online or in dozens of shops and veterinary practices all over the world and EU countries.

# EFFICIENCY OF POLYMETHYLSILOXANE POLYHYDRATE IN GROWING DUCKLINGS

*Yakimenko N.N, Kleticova L.V. , Ponomarev V A. Modern science and its resource support: Innovative paradigm. 2020*

## Abstract

In modern urbanized conditions, ducks are influenced by unfavorable technological factors, such as exotoxins, which violate the homeostatic constants of the body. The first to take the hit is the primary line of defense – the skin and the mucous membranes, then the organs with a high metabolic activity and the enzyme systems of the body, which can lead to the development of endogenous intoxication. Intoxication is accompanied by metabolic disorders, delayed growth and development, slowing down of weight gain and the quality of the products obtained. Drugs with sorption, ion-exchange and sometimes cytoprotective properties are commonly added to the diet of poultry to avoid pathologies by protecting the mucous membrane of the gastrointestinal tract from mechanical and chemical damage and exposure to toxic substances. The effect of Enterozoo (polymethylsiloxane polyhydrate-PMSPH) is established by the strong porous structure of the gel-like matrix which has an absorptive capacity through the molecular adsorption mechanism. This property enables it to firmly bind and remove pathogens from the body, thus reducing the risks of physiological endotoxemia. The objective of this study was to evaluate the effect of PMSPH on the survival rate, weight gain of the ducklings. It was supported by the evaluation of the coprogram after enterosorbent treatment.

## Results

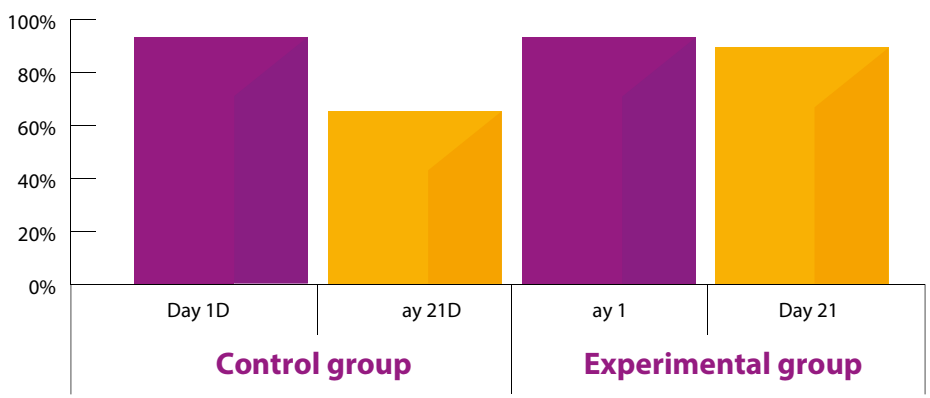
140 ducklings were split into 2 groups of 70 duckling. Control group received standardized diet mixed with probiotic feed Vetom at a dose 50mg/kg per day for 3 weeks. Study group received same diet with addition of Enterozoo 2 hours after the evening feeding at a 0.1% suspension for 21 day. Then survivals rates, dynamics of live weight were recorded.

In control group 8 ducklings died in first 7 days, 6 ducklings in the period of 8-14 days and 6 ducklings in the last 15-21 days.

In the experimental group 2 duckling died in the first 7 days, no ducklings died in the period of 8-14 days, 1 duckling died in the last 15-21 days of the study.

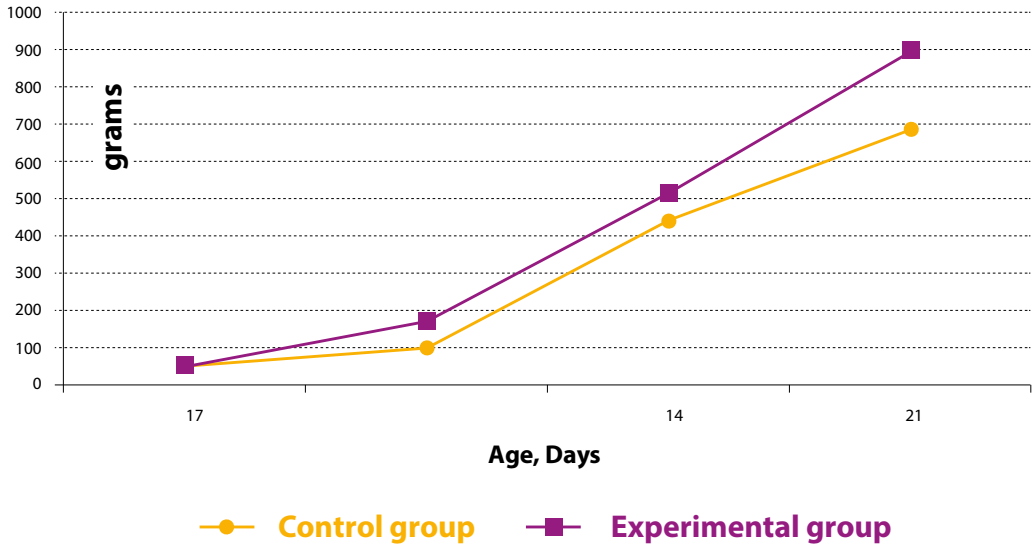
Thus, on the 21st day of the study, the survival rate of ducklings in the control group was 71.4% and 95.7% in the experimental group (Fig. 1).

*Fig. 1 Survival rate of ducklings in the control group and the experimental group*



The average weight of ducklings in the experimental group exceeded the same indicator of the control group at the age of 7, 14 and 21 days by 7,6%, 17.3% and 30.7%, respectively ($p < 0.05$) (Fig. 2). The live weight of the 21-day-old ducklings in the experimental group exceeded the control group by 210.4 g; the increase in the live weight of the ducklings in the experimental group was 843.1 g, in the control group - 632.7 g.

*Fig.2 Changes in live weight of ducklings in the control and the experimental group*




A coprological study in ducklings of the first day of life showed single inclusions of neutral fat and starch grains, from 1 to 3 leukocytes and 1–2 erythrocytes in the field of view. Studies in 21-day-old ducklings of the control group showed the presence of a large amount of indigestible fiber, neutral fat and microorganisms in the preparations

## Conclusion:

Administration of 0.1% suspension of a polymethylsiloxane polyhydrate-based enterosorbent after the evening (last) feeding for 21 days and subsequent observation showed that the applied enterosorbent increases the survival rate of ducklings by 25%; promotes an increase in live weight, average daily weight gain, uniformity of the flock, better digestion of feed, and also binds and removes from the body transient and opportunistic microorganisms and their metabolites.

# DYNAMICS OF LEUKOCYTE INDEXES IN NEWBORN CALVES

*Turkov V.G., Kletikova L.V., Yakimenko N.N. Efficient Livestock 2 (159) (2020): 75-77.*

## Abstract

Neonatal and early postnatal calf pathology causes significant economic damage. To assess the condition of newborn calves, both clinical methods and laboratory tests and integral calculated blood indices are used. Leukocyte indexes provide a very accurate assessment of the level of intoxication, correlate with the dynamics of the pathological process, and make it possible to assess the adaptive potential and stress level of newborn animals. Currently, there are only about 20 integral indicators which can be nominally divided into the following three groups – intoxication indexes, nonspecific reactivity indexes and inflammatory activity indexes.

The goal of this study is to analyze variability of certain types of leukocytes indexes in calves during the neonatal period in agricultural production and then asses efficacy of the Enterozoo (Polymethylsiloxane polyhydrate, PMSPH) on those indexes.

## Results

The study involved 48 clinically healthy calves obtained from cows of the Kostroma breed of 3-4 years of age. The animals were kept in standard conditions adopted at the farm.

During the first days of their life, per veterinary care plan, the calves were injected with serum against pasteurellosis, salmonellosis, escherichiosis, parainfluenza-3 and infectious rhinotracheitis of cattle in accordance with the instructions for use. For the experiment itself, the calves were divided into 4 groups of 12 heads each; group 1 was assigned as the control group and groups 2 to 4 were experimental. The control group received only standard diet (colostrum and dairy products), groups 2, 3 and 4, in addition to the standard diet (SD), received a suspension of polymethylsiloxane polyhydrate (Enterozoo), at a dose of 0.1 g/kg, 0.3 g/kg and 0.5 g/kg of live weight, respectively, 2 hours after the last feeding. Blood samples were taken on day 1, 5 and 15.

The concentration of leukocytes in the blood of newborn calves was (15.86 ± 0.14) x 109/l, with a predominance of segmented neutrophils, the percentage of which reached 60%, double the concentration of lymphocytes. Based on the data obtained, we can conclude that newborn calves have a neutrophilic blood type.

In 5-day-old calves of the control group which received serum the content of leukocytes increased, with 41.2% segmented neutrophils and 49.4% lymphocytes. During this period, there is a physiological overlap between the neutrophils and lymphocytes concentration. The overlap of the leukocyte differential occurs due to the immune system development. At the age of 15 days, the leukocyte count was 13.80x109/l, with 36.8% segmented neutrophils and 54.8% ($p<0.05$) lymphocytes, which once again confirms the change in the rate of formation of different cell shapes.

By day 5, the leukocyte count in group 2 decreased by 18.7%, reaching 7.82x109/l by the age of 15 days, while the percentage of lymphocytes increased by 2.3 times. In group 3, the concentration of leukocytes in the blood of five-day-old calves decreased by 17.2%; by the 15th day, the count was 7.84x109/l, the percentage of lymphocytes increased 2 times. In group 4, on the 5th day of the study, the content of leukocytes in the blood decreased by 27.2% compared to the initial value; it reached 7.12x109/l in 15-day-old calves, and the percentage of lymphocytes increased 2.2 times ($p<0.05$).

It has been established through experimental and clinical studies that the determination of the cellular composition of blood by morphological characteristics allows not only to determine, but also to predict the state of the systems of specific and non-specific immunity and the body as a whole.

LIIr (the intoxication index proposed by B. A. Rais), RNR (reactive neutrophilic response proposed by T. Sh. Khabirov) and NI (the nuclear index proposed by G. D. Dashtayants) are the most informative intoxication indexes (II) used for immunological status assessment. The analysis of the II group revealed that the use of polymethylsiloxane polyhydrate contributes to a significant reduction in intoxication in the calves of the experimental groups.

The indices included in the second group reflect the reactivity of the organism, or its ability to respond differentially to the action of stimuli. This determines the ability of a newborn animal to adapt to changing environmental conditions and to maintain homeostasis.

The considered indixes – IG (the adaptation index proposed by L. Kh. Garkavi) and ISNM (the neutrophils to monocytes ratio index) in newborn calves were 0.51 and 13.58, respectively.

The Garkavi index represents the ratio of the percentage of lymphocytes to the percentage of segmented neutrophils. An increase in IG can be interpreted as a factor in the active response of the body („reactivation") [8].

ISNM allows us to estimate the ratio of the components of the microphage-macrophage defense system . Elevated values indicates an increase in the defense mechanisms of the immune system.

LGI, the lymphocyte-granulocyte index, proposed by I.S. Shevchenko belongs to the group of indices responsible for inflammation.

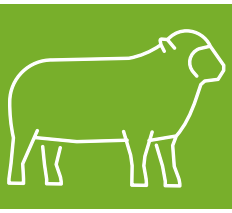
## Table

*Leukocyte indices dynamics in calves from the control and the experimental groups, n = 12 (in every group).*

| Parameter | Intoxication indices | | | Nonspecific reactivity indices | | Inflammation index |
|---|---|---|---|---|---|---|
| | LIIr | RRN | NI | IG | ISNM | LGI |
| Newborn calves | 1.82 | 8.41 | 0.16 | 0.51 | 13.58 | 0.48 |
| **Group 1** | | | | | | |
| 5 days | 0.74 | 2.16 | 0.22 | 1.2 | 5.4 | 1.15 |
| 15 days | 0.60 | 2.37 | 0.22 | 1.49 | 5.22 | 1.45 |
| **Group 2** | | | | | | |
| 5 days | 0.32 | 0.46 | 0.12 | 3.14 | 13.30 | 2.93 |
| 15 days | 0.32 | 0.25 | 0.16 | 3.22 | 11.06 | 2.80 |
| **Group 3** | | | | | | |
| 5 days | 0.55 | 1.06 | 0.07 | 1.78 | 21.36 | 1.73 |
| 15 days | 0.54 | 0.93 | 0.12 | 1.79 | 19.20 | 1.69 |
| **Group 4** | | | | | | |
| 5 days | 0.50 | 2.44 | 0.07 | 2.01 | 23.86 | 1.93 |
| 15 days | 0.47 | 0.58 | 0.07 | 2.12 | 40.24 | 2.00 |

## Conclusion

The concentration of leukocytes in the peripheral blood in newborn calves and their percentage is an unstable indicator and depends on the rate of leukopoiesis. Comparing the data obtained from the control and the experimental groups, the intoxication indexes were significantly lower and the reactivity indexes and the level of cellular protection were higher calves in groups 2, 3 and 4 who received polymethylsiloxane polyhydrate suspension for 15 days compared to the control group. Therefore, information received through traditional diagnostic tests can be supported by integral parameters of the leukocyte differential in clinical investigations and predicting the course of the adaptation process. To reduce the risk of disruption of the adaptation process in the first five days of a calf's life, it is advisable to use a suspension of polymethylsiloxane polyhydrate at a dose of 0.3–0.5 g/kg and in later stages in the dose 0.1–0.3 g/kg of live weight.



# EFFICACY OF USE OF ENTEROZOO IN SHEEP FEEDING RATIONS

*Romanov V.N., Bogolyubova N.V., Devyatkin V.A., Sheep, Goats, Wool work 3 (2017): 34-35.*

## Abstract

There is a necessity to counterbalance negative effects resulting from the administration of poor quality, xenobiotic-contaminated fodders which can be regularly found in livestock production. We find it useful to use enterosorption methods that are able to bind and eliminate toxic substances from the organism. To the date, extensive material on the practical use of bentonites, zeolites, clinoptilolites, activated carbon and mineral shungite and silatranes in fodder have been collected. Materials confirm a positive effect of these products on digestive processes, digestibility, nutrient use in feeding rations, and on metabolism in the animal organism. In this context, practical scientific research into the possibilities of application of organosilicon compound – polymethylsiloxane polyhydrate (Enterozoo)– in livestock production seems very promising.

The goal of this study was to assess efficacy of Enterozoo in improving digestion and metabolism of fodder in sheeps.

## Results

The researcher was conducted on 20 wethers of average weight of 35-40kg; the animals had surgically created ruminal fistulas. Animals were divided into 2 groups per 10 individuals. Control group received basic feeding ration (BFR) consisted of hay and combined fodder. Experimental group received EnteroZoo in dose of 25g per day administered with combined fodder. For the purpose of examining the particularities of these digestive processes, rumen content was sampled one hour before and 3 hours after feeding; for the purpose of examining the state of metabolism in the organism, blood was collected from the throat vein 3 hours before and after feeding.

In the experimental group an increase in hay consumption was observed, resulting in a 12,9% increase in the consumption of dry matter 6.3% increase in the consumption of raw protein, a 33.1% increase in the consumption of raw fat, a 28.8% increase in the consumption of raw cellulose, and a 5.8% increase in the consumption of nitrogen-free extracts.

The administration of EnteroZoo contributed to the increase in the amount of digested substances: dry matter by 16.0%, proteins by 6.5%, BEL by 8.0%, raw fat by 37.0%, raw cellulose by 33.4%, and it also improved the digestibility coefficients.

An improvement in nitrogen metabolism was also found. With the increase in the nitrogen consumption in the feed composition (difference of 6.7%) and increase in the digested nitrogen, nitrogen storage in the organism of the animals receiving EnteroZoo increased by 20.7%, while the difference was reliable, with an increase in utilization coefficients in comparison with received nitrogen increased by 31.2 to 35.4%.

**Indices of rumen metabolism (n = 10)**

| Group | Before feeding | After feeding |
|---|---|---|
| **FFA in rumen fluid (mmol/100ml)** | | |
| Control (BFR) | 7.3 ± 0.11 | 9.02 ± 0.13 |
| Experimental (BFR + PMSPH) | 8.6 ± 0.17 *** | 10.47 ± 0.27 *** |
| % experimental to control | 117.9 | |
| **Ammonia in rumen fluid (mg%)** | | |
| Control (BFR) | 9.62 ± 0.62 | 24.7 ± 1.24 |
| Experimental (BFR + PMSPH) | 11.1 ± 0.97 * | 25.2 ± 1.21 |
| % experimental to control | 115.5 | 116.1 |
| **Amylolytic activity after feeding (L/ml)** | | |
| Control (BFR) | 12.62 ± 0.43 | |
| Experimental (BFR + PMSPH) | 17.94 ± 0.58 *** | |
| % experimental to control | 114.2 | |

*Note: reliable at P: * - <0.05), ** - <0.01), *** - <0.001. (PMSPH – polymethylsiloxane polyhydrate)*

| Index | Group | | | |
|---|---|---|---|---|
| | Control | | Experimental | |
| | g | % | g | % |
| Dry matter | 744.8 ± 23.1 | 70.1 | 864.1 ± 21.5 ** | 71.1 |
| Organic substance | 721.0 ± 22.7 | 71.9 | 815.9 ± 22.1 * | 72.7 |
| Raw protein | 91.4 ± 1.29 | 68.8 | 97.3 ± 1.16 ** | 68.9 |
| Raw fat | 16.2 ± 0.31 | 66.5 | 22.2 ± 1.27 ** | 69.0 |
| Raw cellulose | 124.2 ± 6.4 | 66.2 | 165.7 ± 5.9 ** | 68.7 |
| BEL | 491.9 ± 15.2 | 74.6 | 531.3 ± 16.4 | 76.3 |

*Note: reliable at P: * - <0.05), ** - <0.01)*

**Biochemical blood parameters sheep (n=5)**

| Index | Control group | Experimental group |
|---|---|---|
| Total protein g/l | 69.57±1.22 | 70.87±0.89 |
| Albumin g/l | 28.27±0.43 | 29.60±0.47 |
| Globulins g/l | 41.30±1.1 | 41.27±0.85 |
| ALT IU/l | 18.44±1.03 | 17.13±0.64 |
| AST IU/l | 91.50±2.37 | 80.67±1.87** |
| Creatinine µmol/l | 64.08±3.20 | 74.65±2.21 *** |
| Alkaline phosphatase IU/l | 605,22±20,55 | 659,29±27,31 |
| Glucose mmol/l | 4,18±0,08 | 4,58±0,09** |
| *Statistically significant difference compared to the control, with a value of **p < 0.01; ***p < 0.001* | | |

*The differences are statistically significant compared to the control, with a value of **p < 0.01; ***p < 0.001*

## Conclusion

The application of EnteroZoo has improved the microbial and enzyme- processes in sheep, which manifested itself in the increase of bacterial formation of bacterial mass in the rumen by 25.4%, concentration of volatile fatty acids - by 16.1-17.9%, increased amylolytic activity of rumen fluid - 42,2%. The use of EnteroZoo increased the digestibility of dry matter by 16.0, of protein - by 6.5%, crude fat - by 37.0%, BEB – by 8.0%, crude fiber - by 33.4%.

Application of Enterozoo in the diet of dairy calves at a dose of 0.2 g/kg of body weight improved carbohydrate fat and protein metabolism in the body, increased bactericidal and phagocytic activity, and growth rate of young animals by 7.0 %. EnteroZoo is recommended as a prophylactic agent for sheeps.

# HEALTH CONDITIONS OF CALVES AND STRATEGY FOR THE PREVENTION OF EARLY POSTNATAL PATH

*Kletikova L.V., Martynov A.N., Bulletin of Agricultural Science, 1 (82), February 2020*

## Abstract

The neonatal period of life is subject to a complex of extreme influences that require a continuous change of adaptation mechanisms at different levels of self-regulation. This period is the first of the critical periods of postnatal ontogenesis. In addition to the global change of hemodynamics, metabolism also changes significantly, the processes of anaerobic glycolysis and oxidative phosphorylation are coupled, and the body's own systems of thermal regulation, digestion, and regulation of ionic homeostasis kick in. As a rule, newborn calves have a wide range of fluctuations in individual parameters in the process of general adaptation, which is an indicator of high reserve capabilities.

Purpose of the study was to study the effect of EnteroZoo sorbent on the hemato-physiological profile and morbidity of calves in the early postnatal period.

## Results

The study was conducted on 20 healthy cows from neonatal period. 10 calves were in the control group which received only standard ration and 10 calves were in the experimental group which received standard ration and Enterozoo (polymethyl-siloxane polyhydrate) at a dose of 0.05 g/kg of live weight 2 hours after last feeding. The first blood test was carried out in newborn calves before they drank colostrum, and it was repeated at the age of 21 days.

In the calves of the control group, on day 21, a drop in hemoglobin, erythrocytes and hematocrit values by 63.4%, 49.5% and 24.6%, respectively, was noted ($p < 0.05$). These indicators reflect the development of iron deficiency anemia which was accompanied by an increase in the concentration of leukocytes by 8% and a significant increase in platelets. The cause of the development of anemia, leuko- and thrombocytosis was the disease of the calves: in eight calves of 1–3 days of age, simple dyspepsia was revealed; in two of them it turned into a toxic form with the subsequent development of enteritis. Calves were not excluded from the experiment and received appropriate treatment.

| Results of biochemical parameters of blood serum of calves | | | |
|---|---|---|---|
| **Indicator** | **Newborn calves** | **21-day-old calves** | |
| | | *Control group (n = 10)* | *Experimental group (n = 10)* |
| Total protein, g/l | 62.5±2.4 | 51.8±3.0 | 62.7±2.8 |
| Albumin, g/l | 37.4±2.3 | 23.4±2.5 | 34.7±2.0 |
| Globulins, g/l | 25.1±1.4 | 28.4±2.7 | 28.0±2.0 |
| Albumin,% | 59.8±0.7 | 45.2±0.4 | 55.3±0.5 |
| Globulins, % | 40.2±0.6 | 54.8±0.7 | 44.7±0.3 |
| Protein ratio | 1.48±0.2 | 0.82±0.3 | 1.24±0.2 |
| Urea, mmol/l | 2.68±0.96 | 3.2±0.9 | 3.2±0.6 |
| Glucose, mmol/l | 3.54±0.26 | 4.9±0.6 | 4.7±0.5 |
| Total bilirubin, mmol/l | 15.35±2.85 | 2.6±0.4 | 2.4±0.3 |
| Total calcium, mmol/l | 2.22±0.22 | 2.0±0.1 | 2.2±0.1 |
| Inorganic phosphorus, mmol/l | 2.07±0.13 | 2.7±0.2 | 2.8±0.2 |
| ALT, U/l | 29.0±6.4 | 26.7±6.6 | 30.5±3.9 |
| Alkaline phosphatase, U/l | 797.6±105.9 | 748.4±38.7 | 732.8±14.6 |

| Results of hematological parameters | | | |
|---|---|---|---|
| **Indicator** | **Newborn calves** | **Control group** | **Experimental group** |
| Leukocytes, x109/l | 13.82±4.69 | 14.92±1.73 | 9.40±0.86 |
| Erythrocytes, x1012/l | 6.62±0.49 | 2.42±0.34 | 7.43±0.59 |
| Hemoglobin, g/l | 94.9±7.4 | 47.92±1.78 | 82.48±2.76 |
| Hematocrit,% | 28.5±2.5 | 21.5±0.4 | 23.4±0.7 |
| Thrombocytes, x109/l | 219.7±68.4 | 1014.1±94.3 | 934.7±106.8 |

## Conclusion

80% of calves in the control group had dyspepsia by day 21. Anemia, leukocytosis, thrombocytosis, hyperglobulinemia, hyperphosphatemia was found in the blood of the animals.

In the experimental group of calves during the entire study period, no diseases were noted; hematological parameters were within the reference values; the concentration of protein, albumin, total calcium, erythrocytes and hemoglobin was higher, and the total bilirubin and leukocytes were lower than in the control calves analogues. EnteroZoo demonstrated protective properties during the period of postnatal adaptation of the animals and contributed to the elimination of protein breakdown products and their metabolites from the body without reducing the absorption of nutrients, vitamins, micro- and macro elements. Through its direct and indirect mechanism of action, the enterosorbent demonstrated a detoxifying, hypothermic and antidiarrheal clinical effect.

# THE EFFECT OF SORPTION THERAPY ON PROTEIN METABOLISM IN CALVES WITH DIARRHEAL SYNDROME

*Voronova K.A, Kletikova L.V., Efficient animal husbandry 8 (174) (2021): 93-95.*

## Abstract

Acute gastrointestinal diseases in neonatal calves are widespread and they cause extensive economic damage. Neonatal calves quite often suffer from food-borne and functional diarrhoeas which frequently become complicated by potentially pathogenic and pathogenic micro-organisms. Annually, in the economy of the Russian Federation, 70–80% of neonatal calves are affected by gastrointestinal tract disorder. According to verified data of domestic authors, calves mortality occurs more often during days 2–5 or 7–10 and may make up to 55%. Having analysed the experimental and statistical data, the scientists have come to a conclusion that out of all the occurrences of animal mortality about 50% is attributed to the death of calves during the first 10–15 days of life. Diarrhoeal syndrome in calves is a fairly common and, at the same time, a complex problem in the practice of the veterinary specialist of any enterprise. As a rule, the origin diarrhoea cannot be identified immediately, and, therefore, timely prescription of adequate therapy is impossible. Dysbacteriosis is considered one of the key factors in the development of a digestive disorder, which is caused by the fact that the stomach and intestines do not receive normal flora micro-organisms immediately after birth.

Purpose of the study was to confirm efficacy and safety of Polymethylsiloxane polyhydrate (Enterozoo, PMSPH) in treatment and prevention of diarrhoeal syndrome in newborn calves.

## Results

Two group of calves were formed, aged from 2 to 5 days. Each group included 12 animals. The control group received electrolytic solution consisting of 2.0 l of water, 15 g of sodium chloride, 10 g sodium hydrogen carbonate and 300g of glucose. The experimental group received the same elecrolytic solution and Enterozoo in a dose of 0.5g per kilo of body weight 1 hour prior to feeding, twice a day. The treatment was conducted for 3-5 days, based on the animal's condition.

Treatment of calves with diarrhoeal syndrome in presence of the standard therapy took 5–7 days, combine with sorption therapy took 3 days.

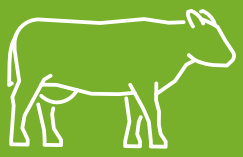
**Dynamics of protein and nitrogen metabolism in calves of the control and experimental groups (n=12)**

| Values | Groups of calves | | | |
|---|---|---|---|---|
| | Before treatment | | After treatment | |
| | Control | Experimental | Control | Experimental |
| Total protein, g/l | 93.10 ± 1.10 | 95.99 ± 0.98 | 87.45 ± 0.67 | 86.70 ± 1.70* |
| Albumins, g/l | 33.05 ± 1.06 | 32.96 ± 1.27 | 27.09 ± 1.10 | 27.10 ± 0.96 |
| Globulins, g/l | 60.05 ± 0.95 | 63.03 ± 0.30 | 60.36 ± 0.45 | 59.60 ± 0.75 |
| Albumin-globulin ratio | 0.55 | 0.52 | 0.45 | 0.45 |
| Creatinine, mcM/l | 213.40 ± 7.04 | 209.60 ± 7.10 | 146.78 ± 4.6 | 125.20 ± 9.44* |
| Urea, mM/l | 0.80 ± 0.03 | 0.80 ± 0.04 | 1.20 ± 0.07 | 1.27 ± 0.10* |
| Total bilirubin, mcM/l | 15.10 ± 0.67 | 14.42 ± 0.42 | 8.25 ± 0.20 | 7.50 ± 0.47* |
| *Statistical difference *p≤0.05* | | | | |

## Conclusion

**Administration of Enterozoo to calves in a dose 0,5g per kg 2 times a day 1 hour prior to feeding promotes:**

- restoration of hydrobalance, which is manifested by a decrease in the concentration of total protein and albumin;
- mprovement of the liver's barrier function, and decrease of intermediate metabolites concentration (total bilirubin and creatinine) in blood;
- stimulation of the functional activity of the gastrointestinal tract accompanied by concentration increase of urea in blood serum.



# METABOLIC CHANGES IN COWS WITH MASTITIS AND THEIR DYNAMICS IN PRESENCE OF SORPTION THERAPY

*Kletikova L.V., Mannova M. S., Herald KrasGAU 2021. № 7. C. 135–142*

## Abstact

Mastitis occurs both in high productivity and low productivity animals, both during the milking period and during the dry period irrespective of the season [1]. Mammary gland inflammation is a widespread condition at milk-producing complexes and farms, additionally, the morbidity in some herds can reach 35–60 %, and within a year up to 60–75% of the cows in the herd may be affected [2]. The inflammation, as a rule, arises in presence of an immunodeficient condition in both the organism as a whole and a decrease in the local immunity of the mammary gland [3]. Bacterial contamination of cows' mammary gland is acute problem today. Microflora can get into the mammary gland by various routes: galactogenous — via teat canal, by hematogenous and lymphogenous routes. The priority role is played by the galactogenic route by which the causal organisms enter from the environment through the teat canal [8]. Classical treatment is not efficient enough, since the microbial attack upon a cow's organism leads to morphological changes in the mammary gland tissues, to disorder in homeostasis and immunologic reactions, decrease of resistance and of stress stability [11].

Purpose of the study is to assess integration of enterosorbent Enterozoo (polymethylsiloxane polyhydrate, PMSPH) into the treatment regimen of mastitis in cows.

## Results

28 cows of an average age of 3,7 years were divided into 3 groups. 1st control group (n=10) received standard therapy, which included 10ml of "Gamaret" suspension intrammmary and 10% solution of "Marboflocin" subcutaneously in a dose of 15ml once daily for 5 days. The 2nd experimental group (n=8) received standard therapy and Enterozoo (PMSPH) 2 hours after last feeding in dose 0.2 mg of Enterozoo per kg of body weight. The 3rd experimental group (n=10) received standard therapy and Enterozoo (PMSPH) 2 hours after last feeding in a dose of 0.5 mg per kg of body weight.

The cows suffering from mastitis, prior to the beginning of treatment had hyperproteinemia, total protein level exceeded the upper normal limit (60–85 g/l) by more than 22.00% at the same time the albumin-globulin ratio varied from 0.56 to 0.71

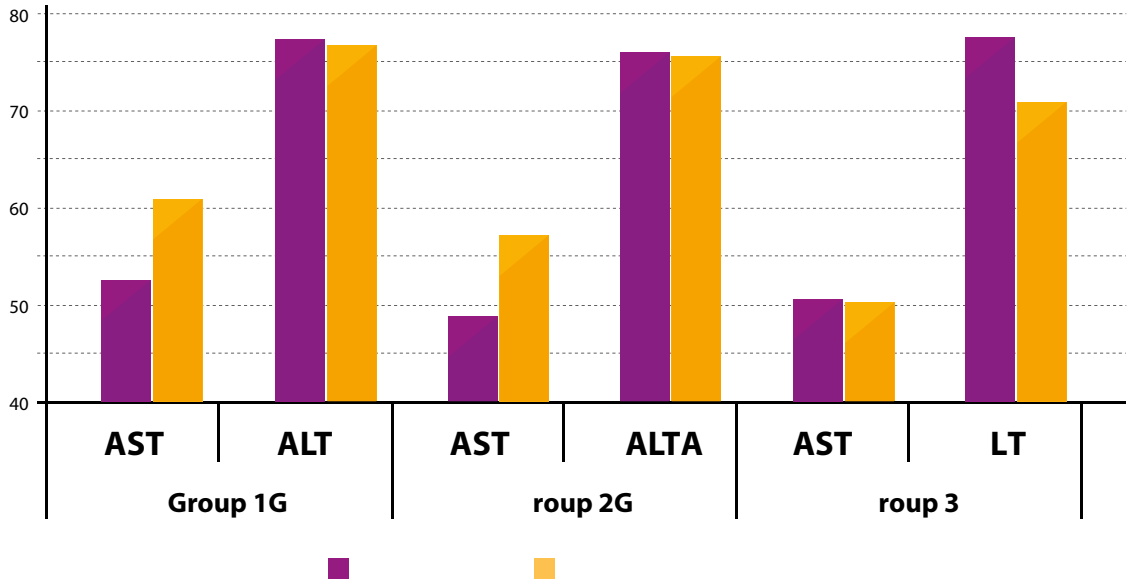
**The dynamics of metabolism in cows**

| Indicator | 1. group (n = 10) | 2. group (n = 8) | 3. group (n = 10) |
|---|---|---|---|
| **Before treatment** | | | |
| Total protein, g/l | 104.53±1.26 | 103.88±0.92 | 104.35±1.02 |
| Albumin, g/l | 37.81±0.25 | 43.05±0.16 | 39.21±0.09 |
| Globulins, g/l | 67.43±0.77 | 60.83±0.48 | 65.14±0.06 |
| Creatinine, mcM/l | 94.06±1.08 | 95.32±0.18 | 98.91±0.36 |
| Urea, mM/l | 2.46±0.20 | 2.47±0.06 | 2.66±0.22 |
| Total bilirubin, mcM/l | 6.80±0.50 | 8.25±0.62 | 6.90±0.19 |
| Direct bilirubin, mcM/l | 1.15±0.65 | 0.83±0.01 | 1.95±0.05 |
| **After treatment** | | | |
| Total protein, g/l | 109.10±1.10 | 95.02±1.57 | 95.76±1.66 |
| Albumin, g/l | 39.41±0.36 | 38.13±0.18 | 40.38±0.22 |
| Globulins, g/l | 70.43±0.87 | 46.89±0.87 | 45.38±0.43 |
| Creatinine, mcM/l | 97.11±1.08 | 88.74±1.44 | 88.85±1.47 |
| Urea, mM/l | 2.93±0.12 | 2.56±0.05 | 2.92±0.04 |
| Total bilirubin, mcM/l | 7.00±0.20 | 6.35±0.35 | 6.80±0.40 |
| Direct bilirubin, mcM/l | 0.40±0.02 | 0.42±0.19 | 0.56±0.03 |

**The dynamics of energy exchange in cows**

| Value, mM/l | 1. group n = 10 | 2. group n = 8 | 3. group n = 10 |
|---|---|---|---|
| **Before treatment** | | | |
| Glucose | 10.10±0.90 | 10.15±0.85 | 11.45±0.95 |
| Cholesterol | 3.73±0.17 | 3.92±0.40 | 4.54±0.03 |
| Triglycerides | 0.17±0.04 | 0.16±0.03 | 0.16±0.03 |
| **After treatment** | | | |
| Glucose | 3.90±0.50 | 3.40±0.405 | 3.80±0.05 |
| Cholesterol | 3.69±0.26 | 3.60±0.32 | 3.31±0.09 |
| Triglycerides | 0.13±0.01 | 0.14±0.01 | 0.15±0.01 |

**The dynamics of transaminases activity in cows**




The analysis of the obtained data is the evidence that at the farm, in presence of a high-concentrate type of feeding, hyperproteinemia is observed in cows, which can lead to metabolic disorders, such as ketosis and fatty hepatosis.

Inflammation of the mammary gland was accompanied by a shift of the albumin-globulin ratio with prevalence of the globulin fraction and hyperglycaemia associated with the influx the stress hormone in presence of an expressed pain reaction.

## Conclusion

The standard therapy does not include preparations aimed at increasing resistance, enhancing metabolic processes, removing intoxication symptoms and egesting intermediate metabolites.

Administration of enterosobent Enterozoo (polymethylsiloxane polyhydrate) alone promoted decrease in the concentration of total protein and cholesterol, and it also promoted improvement of the metabolic processes in liver, evidence to which is the normalization of albumin-globulin ratio and the decrease in alkaline phosphatase activity.

Based on the data received as a result of study of serum biochemical indexes in cows suffering from mastitis who received in addition to the standard therapy a suspension of enterosorbent Enterozoo, we can assume that the most effective dose is 0,5 mg/kg of live weight 2 hours after feeding.

# CHANGE OF PERIPHERAL BLOOD INDICATORS OF NEWBORN CALVES IN PRESENCE OF APPLICATION OF POLYMETHYLSILOXAN

*Yakimenko N.N., Mannova M.S., Bulletin of the Kursk state agricultural academy 5 (2020): 105-110*

## Abstract

Cellular composition of blood in neonatal animals makes it possible to estimate the state of their homeostasis, however these indicators are not unchangeable, and it reflects the quantitative and qualitative changes which accompany the continuous change of the physiological processes in the body. During the first period of the postnatal ontogenesis a calf's organism is very vulnerable, therefore regular curation and study of hematological indicators are very important.

Purpose of the study was to evaluate the change of hematological indicators during neonatal period and the effect of polymethylsiloxane polyhydrater (PMSPH, Enterozoo) on these blood indicators in newborn calves.

## Results

4 groups of calves, 12 animals each, were formed for performing the experiment. The first group served as the control one and received colostrum and milk according to the age , experimental groups 2, 3, and 4, in addition to the basic diet, received suspension of polymethylsiloxane polyhydrate (PMS PH), in dosages 0.1g, 0.3g and 0.5g of PMSPH per kg od body weight, 2 hours after the last feeding. The most meaningful indicator for neonatal animals, which determines their viability is the content of erythrocytes, hemoglobin and erythrocyte indexes. For calves of the first days of life characteristic is low content of erythrocytes and hemoglobin, associated with the replacement of the fetal hemoglobin with subsequent hemolysis of erythrocytes.

**Dynamics of red blood cells indicators in neonatal calves of the control and experimental groups**

| Indicator | RBC, ×1012/L | HGB, g/L | HCT, % | MCV, fL | MCH, pg | MCHC, /L |
|---|---|---|---|---|---|---|
| Newborns | 6.97±0.04 | 98.40±2.08 | 30.16±0.58 | 43.34±0.58 | 14.06±0.19 | 326.0±3.2 |
| **Group 1 (n=12)** | | | | | | |
| 5 days | 9.31±0.52 | 129.60±2.08 | 37.46±1.59 | 40.28±0.62 | 14.02±0.62 | 340.6±11.1 |
| 15 days | 8.80±0.14 | 116.20±3.36 | 33.34±1.69 | 38.86±2.61 | 13.02±0.78 | 348.6±8.7 |
| **Group 2 (n=12)** | | | | | | |
| 5 days | 9.60±0.24 | 128.50±2.50 | 38.57±0.38 | 40.60±1.10 | 13.50±0.47 | 333.0±3.7 |
| 15 days | 9.37±0.24 | 119.67±3.33 | 37.40±0.67 | 39.93±0.87 | 12.83±0.13 | 320.2±7.5 |
| **Group 3 (n=12)** | | | | | | |
| 5 days | 8.76±0.38 | 122.67±3.56 | 34.97±1.04 | 40.00±1.60 | 14.00±0.40 | 351.0±8.0 |
| 15 days | 9.28±0.05 | 121.60±2.08 | 35.42±0.10 | 38.16±0.23 | 13.12±0.18 | 343.6±5.3 |
| **Group 4 (n=12)** | | | | | | |
| 5 days | 9.67±0.22 | 142.40±3.52 | 42.06±0.61 | 43.60±1.36 | 14.72±0.10 | 339.8±4.2 |
| 15 days | 9.25±0.13 | 124.20±1.44 | 40.52±0.46 | 43.82±0.18 | 13.42±0.06 | 307.0±1.2 |

Leukocytes and thrombocytes play a major role in the body's resistance to environmental factors during neonatal period. During the first days after birth the concentration of circulating leukocytes in peripheral blood may increase. As a result of injecting newborn calves with serum against pasteurellosis, salmonellosis, escherichiosis, parainfluenza-3 and infectious bovine rhinotracheitis, a pronounced leukocytic reaction was noted in the control group by day 5 with followed by a decrease in the white blood cell count.

**Dynamics of leukocytes and thrombocytes in neonatal calves**

| Indicator | Newborns | Group 1 | | Group 2 | | Group 3 | | Group 4 | |
|---|---|---|---|---|---|---|---|---|---|
| | | day 5 | day 15 | day 5 | day 15 | day 5 | day 15 | day 5 | day 15 |
| WBC, ×109/L | 15.86 ±0.13 | 30.98±0.26 | 13.80±0.32 | 12.43±0.24 | 7.82±0.22 | 13.14±0.52 | 7.84±0.11 | 11.54±0.37 | 7.12±0.34 |
| PLT, ×109/L | 359.40±5.68 | 475.4±7.68 | 524.8±8.64 | 566.7±4.67 | 536.5±13.5 | 545.7±4.33 | 555.4±12.9 | 471.6±16.5 | 602.0±8.8 |

## Conclusion

It was established that the calves within the first days of life have low hemoglobin content, erythrocytes, hematocrit value, and high leukocyte content. The 5-day control calf showed an increase in leukocyte concentration and a subsequent decrease in the leukocyte level, with serum injected into calves against pasterella, salmonellosis, escherichiosis, parainfluenza-3 and infectious cattle rhinotracheitis. An increase of red blood cells indicators was observed in the calves at the age of 5 days, and their insignificant decrease by the age of 15 days.

The experimental groups of the calves, which, throughout the entire period of the study, received a suspension of Enterozoo (polymethylsiloxane polyhydrate) possessing absorptive and protective properties were less subjected to physiological endotoxemia. Detoxication properties of the PMSPH preparation may manifest themselves in a less expressed leukocytic reaction in response to serum introduction, higher content of hemoglobin, erythrocytes, hematocrit, and thrombocytes.

Based on the results of the experiment, it is recommended that to the calves at the age from 1 to 5 days it is expedient to administer suspension of Enterozoo in a dose of 0.5 g per kilo of body weight, at the age from 5 to 15 days — in a dose of 0.1-0.3 g per kilo of body weight after evening feeding.

# USE OF ‚ENTEROZOO' IN BROILER CHICKENS TO PREVENT CHRONIC MYCOTOXICOSIS AND STIMULATE THEIR PRODUCTIVITY

*Gulyushin S.Y, Elizarova E.V. Study report „Russian scientific research and technological institute of poultry farming" 2016*

## Abstract

Russian market is partially deprived of the opportunity to consume Western agricultural products, but on the other hand the sanctions stimulate Russia to address agricultural production ourselves, whether in terms of crop production or animal husbandry, or the production of fodder, feed supplements, and veterinary products for farm animals and poultry.

Considering that issues with mycotoxicosis in poultry are among the leading problems, we have set out the task of studying this new product in terms of prevention of the given pathological condition, as well as determining the impact of this product on the dynamic of poultry growth, maintaining population and meat production.

The objective of the experimental work was to study the effectiveness of various methods of using EnteroZoo to prevent food poisoning caused by mycotoxins and to evaluate the possibility of using it for nonspecific stimulation of poultry productivity by adding it to conditionally pure fodder.

## Results

The work was performed on broiler chickens, which were divided up based on the principle of analogy into 5 groups (two control and three experimental) of 38 animals in each.

| Plan of the study | |
|---|---|
| Groups | Specifications of feeding |
| **Combined feed without mycotoxins** | |
| 1. Control | Basic ration (BR) according to the norms of VNITIP (2010) without mycotoxins |
| 2. Experimental | BR + EnteroZoo at a rate of 0.5% (5 kg/t) |
| **Combined feed with mycotoxins** | |
| 3. Control | Basic ration (BR) according to norms of VNITIP with mix of mycotoxins: ochratoxin A – 201 mg/kg, T-2 toxin – 407 mg/kg, aflatoxin B1 – 73 mg/kg, fumonisin B1 – 23.7 mg/kg (Σtoxin = 15.7 MPC) (maximum permissible concentration) |
| 4. Experimental | BR1 + EnteroZoo – 0.5 % (5 kg/t) |
| 5. Experimental | BR1 + EnteroZoo – 1.5 % (15 kg/t) |

**The study took into account the following indicators:**

- maintenance of initial number – by everyday records of dead birds and determining the cause of death;
- live weight at age of one day, three weeks and five weeks – by weighing all birds;
- total feed consumption – by everyday records of feed distributed to groups and uneaten leftovers;
- consumption of feed per 1 kg increase of chicken live weight (at end of rearing period) – by calculation;
- gross increase (GI) of live weight in the group – based on the formula: {final livestock [heads] x live weight at end of rearing [kg] – initial livestock [heads] x live weight at start of rearing [kg]};
- European Broiler Index (EBI) – according to formula: {live weight [kg] x survival rate [%] / (feeding period [days] x conversion [kg/kg]} x 100%;

## Table results:

| INDICATORS | Pure feed ration | | Feed ration with mycotoxins | | |
|---|---|---|---|---|---|
| | 1 (C) | 2 | 3 (C) | 4 | 5 |
| | BR | BR + 5 kg/t of EnteroZoo | BR1 | BR1 + 5 kg/t of EnteroZoo | BR1 + 15 kg/t of EnteroZoo |
| Retention of numbers during rearing, % | 97.4 ± 2.6 | 100.0 ± 0.0 | 81.6 ±6.42 | 89.5 ± 5.01 | 94.7 ± 3.72 |
| Live weight of chickens at 3 weeks, grams | 854.2±11.5 | 849.1±14.7 | 643.7±18.25 | 669.5±17.65 | 711.0±14.654 |
| Live weight of females at 5 weeks, grams | 1695.0±34.2 | 1702.8± 30.3 | 1416.2± 31.15 | 1491.7± 28.851 | 1567.3± 34.334 |
| Live weight of males at 5 weeks, grams | 2195.4± 29.3 | 2231.8± 35.6 | 1805.0± 38.35 | 1916.4± 27.253 | 2098.5± 31.025 |
| Average weight (50 %♀+50 %♂), grams | 1945.2± 31.8 | 1967.3± 33.0 | 1610.6± 34.75 | 1704.0± 28.052 | 1832.9± 32.735 |
| Gross increase of live weight in group, kg | 70.37 | 73.16 | 48.33 | 56.34 | 64.38 |
| European Broiler Index, units | 324.1 | 334.6 | 169.1 | 222.3 | 261.0 |

*Zootechnical indicators of rearing broiler chickens with inclusion of the feed additive „EnteroZoo" in combined feed with mycotoxins (n=38)*

As was to be expected, the chronic mycotoxicosis caused by adding in two Fusarium (T-2 toxin, fumonisin B) and two Aspergillus (alfatoxin B1, ochratoxin A) metabolites into the feed in the above amount (Group 3) was characterised by a reduction in preservation of initial numbers. Maintenance of the initial numbers of the experimental group of birds that were administered EnteroZoo (Groups 4-5) had a tendency to a significant increasing by 7.9% and 13.1% depending on the increased amount of the product added to the feed from 5 to 15 kg/t. This points to the effectiveness of its use, and in fact the expediency of using higher doses during evident pathological processes.

Against the contrasting background of model toxicosis it is particularly evident that the substance being studied, included in contaminated feed at a level of 5 and 15 kg/t, significantly increased the live weight of chickens in comparison with the negative control group (group 3) – by 5.8–13.8% ($r \leq 0.05$-$0.001$), but this group still lags – as at the age of 3 weeks – by 16.2% ($r \leq 0.001$-$0.2$) behind the peers from Group 1. Nevertheless it attests to the ability of EnteroZoo to remove a considerable portion of the toxic agents from the body, which inevitably resulted in regeneration of the bird's productive potential.

In order to rule out a free interpretation of the numerical material – analogous calculations in relation to the gross increase (GI) and European Broiler Index (EBI). These are not only objective indicators that integrate the value of live weight and preservation of initial numbers, but also the most valuable and most desirable results of poultry farming under industrial conditions. The data shows that when using Enterozoo with the given level of toxicity in the rations, its application can have a positive effect of as much as 35-66%.

## Conclusion

Inclusion of EnteroZoo at an amount of 5 kg/t in conditionally pure feed had a stimulating effect on retaining the initial numbers and live weight of broilers, though a certain increased consumption of feed was noted along with lower efficiency of use thereof by the birds.

Inclusion of EnteroZoo in an amount of 5 and 15 kg/t in feed rations contaminated by a mix of mycotoxins (sum toxicity of 15.7 MPC) had a positive effect on the organism: for chickens the indicators of preservation of initial numbers and average daily weight increase considerably increased; the birds made better use of the nutrients in the food, which led to improved production indicators in growing broilers suffering from a chronic form of combined mycotoxicosis. This all allowed for a 35-66% mitigation of negative consequences compared with animals of the same age that consumed analogous combined feeds without the added studied substance.

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