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## Pathoanatomical diagnosis, treatment and preventive measures at pigs gastroenterocolitis

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*The reasons of the occurrence of gastroenterocolitis of pigs, their pathomorphological manifestations are being discussed, the schemes of treatment and prophylaxis are offered. The most common factor-related infections in pig breeding are colibacillosis, dysentery and ileitis (proliferative enteropathy). Colibacteriosis occurs from birth to 50–60-day age, and dysentery with ileitis - from 2 to 5–6 months. It was established that the development of gastroenterocolitis is associated with a violation of the balance of the microflora and the reproduction of pathogenic strains of microorganisms, which can lead to the development of colibacteriosis, dysentery and ilite, sometimes – clostridiosis. In the pathoanatomical picture of colibacteriosis erosive gastroenteritis predominates, for dysentery – hemorrhagic colitis, for ileitis – proliferative ilite and colitis, for clostridiosis – hemorrhagic-necrotic enterocolitis. The analysis of veterinary measures carried out on farms showed a lack of a systematic approach to the treatment of factor infections. This was especially true for small farms, which attracted attention to the limited range of antibiotics, incorrect dosage of drugs, chaotic use of antimicrobial treatments. Experimental authors have compiled a universal preventive scheme for subpigmented piglets and breeding animals of the group that contained measures against gastroenterocolitiss of different etiologies. The work emphasizes the general prevention of diseases of the digestive system: providing animals with balanced quality feeds, improving the conditions for keeping pigs and conducting adequate medical and preventive measures.*

**Key words:** pigs, gastroenterocolitis, colibacteriosis, dysentery, ileitis, pathoanatomical diagnosis, treatment, preventive schemes.

### Introduction

For a long time, gastroenterocolitis occupy a leading place in the pathology of pigs and was considered in the national scientific literature as a section of non-pathological pathology. Subsequently, modern technology of growing pigs spread in Ukraine, high-yielding breeds of cattle were introduced, At the same time, new diseases of animals were registered, which required an updated perception and attitude to diagnosis, treatment and prevention. Thus, diseases of the digestive canal in contemporary world scientific literature are considered today, mainly as manifestations of specific infections, which lead to certain pathological changes (Pejsak, 2012). That is why the gastroenterocolitis belong to polyetiological diseases, which includes a number of infectious pathogens (both specific and opportunistic pathogens), which cause their manifestations (Burke,

1989; Lindecrona et al., 2004; Esina and Kostjushkevich, 2007; Prodanov-Radulovich et al., 2014). Of course, and treatment should be aimed to oppression of pathogenic action of microorganisms with the simultaneous normalization of impaired technological parameters (Food and Agriculture..., 2010; Pejsak, 2012).

Disturbances of digestion in pigs of different ages are complicated by secondary microflora, which is always present in pig farms and, of course, causes economic losses to the economy (Pejsak, 2012; Gavrillin et al., 2013). There are certain critical moments in the stages of the technological cycle (weaning, change of feed, transfer to the next technological group, etc.), when there is an aggravation of these infections, which is usually accompanied by inflammation of the mucous of the digestive canal, diarrhea, loss of live weight, dehydration and death (Burke, 1989; Richards et al., 2005; Huang et al., 2010).

The most common factor-related infections in pig breeding are colibacillosis, dysentery and ileitis (proliferative enteropathy). Colibacteriosis occurs from birth to 50–60-day-old age, and dysentery with ileitis – from 2 to 5–6 months (Leser et al., 2000; Kehl, 2002; Ngeleka et al., 2003; Lindecrona et al., 2004; Richards et al., 2005).

The most vulnerable are piglets in the matrix, as well as animal rearing (post-stress stress and edema) (Ngeleka et al., 2003; Nyachoti et al., 2006; Tako et al., 2007). At this time there is an intensive growth of animals, which further determines the length of fattening. Disease of gastroenteritis can significantly inhibit the growth rate of animals. The increase in the number of backward piglets significantly impairs the farm's economic indices (Povod et al., 2008; Pejsak, 2012; Gavrilin et al., 2013).

The development of colibacillosis is accompanied by a number of factors. First and foremost, this is a reduction in the resistance of piglets against the background of a shortage of milk in the sow and possible hypothermia. Animals can also get sick due to an increase in the number of pathogenic bacteria in the environment during a massive sickness of pigs. Inflammation of the mucous membrane of the small intestine and stomach is observed for colibacillosis. Swelling of the mucous membrane and digestive glands reduces the quality of enzymatic feed processing and absorption of nutrients (Tako et al., 2007). As a result, there is a general intoxication of the organism, which also inhibits the development of piglets (Woodward et al., 1992; Kehl, 2002; Ngeleka et al., 2003; Verdonck et al., 2007). Joining of pulmonary infections against colibacillosis enhances the situation and enhances the heterogeneity of the livestock population (Stege et al., 2004; Povod et al., 2008; Gavrilin et al., 2013).

In the group of problems growing up with colibacillosis and edema are gradually changing to diseases with dysentery and ilite (Leser et al., 2000; Lindecrona et al., 2003; Stege et al., 2004; Lindecrona et al., 2004; Niekamp et al., 2007). Usually, their occurrence occurs on the background of low-quality foods feeding that contain a large number of mycotoxins, excessively small or excessive food particles (Morel et al., 2000; Richards et al., 2005; Povod et al., 2008; De Lange et al., 2010; Willing et al., 2012). Disturbance of temperature regime promote the development of these diseases as well. Sometimes signs of catarrhal or hemorrhagic colitis are joined by the phenomena of hemorrhagic-necrotic enterocolitis, which arises as a result of the life of clostridia (type C). The disease is characterized by a sharp course and quickly ends with the death of the animal (Kelch et al., 2000; Esina et al., 2007; Povod et al., 2008; Prodanov-Radulovich et al., 2014).

The complicating factor in the pathogenesis of gastroenterocolitis, especially in the group of rearing, is the circovirus infection (PCV-2) of pigs (Segales et al., 2005; Pejsak, 2012). Its presence in the herd significantly reduces immunity and contributes to the severe course of infections of the digestive canal (Burke, 1989). If the animals in the farm simultaneously with the circovirus infection are diagnosed with the virus of the respiratory-reproductive syndrome of pigs, the treatment of gastroenterocolitis in such cases becomes even more

complicated and requires additional material costs and time (Pejsak, 2012).

Distribution and development of gastroenterocolitis often occur in animal housing in the absence of a system of «empty-occupied», unplanned transfer of pigs from the machine to the machine, ignoring the disinfection regime, etc (Food and Agriculture..., 2010; Pejsak, 2012). According to literary scientific sources and experience, the main efforts should be directed towards the prevention of infections, creating appropriate conditions for the animals (Food and Agriculture..., 2010). And if the infection has flared up, you should adhere to the principles of rational antibiotic therapy, use drugs only in therapeutic dosage taking into account the sensitivity of different types of microorganisms to certain types of antibiotics (Gavrilin et al., 2013).

*The purpose of our work* was to investigate clinical and pathoanatomical signs of colibacteriosis, dysentery, ilite and cholestridiosis in pigs, as well as to identify technological violations that cause their occurrence; to offer modern schemes of treatment and prevention of diseases.

## Materials and methods

The works were carried out during 2014–2015 on the basis of farms of Demis-Agro Ltd. of the Dnipro district (1800 sows) and small farms of Novomoskovsk, Pavlograd and Sinelnikivsk districts (less than 200 sows) of Dnipropetrovsk region. Comprehensive diagnosis of diseases of pigs of different age groups included the study of technological features of each farm; analysis of the forage base and animal retention conditions; chemical and toxicological search of feed; general clinical examination of animals in farms; pathoanatomical section of piglets of different age groups (300 head) with further pathologist histological examination of samples of altered tissues; bacteriological examination of pathological material and feed; blood serum tests; parasitological search of samples of feces and patmaterial.

Special investigations were carried out on the basis of SIC of biosafety and environmental control of AIC resources at the Dnipro State Agrarian and Economic University.

Samples of feeds on the results of the chemical-toxicological search had acceptable levels of mycotoxins, but during the period of work with farms, which do not have their own forage base and constantly buy grain, from time to time it turned out to be unsuitable for feeding animals a batch of grain.

The patho-anatomical section of corpses was carried out in the dorsal position by the method of Shor.

For pathological and histological examination, pieces of organs of 0.5–1.0 cm thickness were cut, fixed in a 10% aqueous formalin solution, poured into paraffin, stained with hematoxylinum-eosin. The most characteristic macro and microstructures were photographed using a Canon EOSD30 digital camera, the total magnification of the microscope and the camera on the histograms was  $\times 100$  and  $\times 400$  (Esina et al., 2007; Povod et al., 2008; Gavrilin et al., 2013).

During the work on farms, universal schemes of treatments for suckling piglets and in the group of rearing were made. The presence of a gliest invasion, which could also cause gastroenteritis, was excluded in connection with the fact that farm animals were regularly used anti-helminthic drugs with subsequent control with parasitological searches.

### Results and discussions

*Analysis of the clinical condition of animals by technological groups.* All technological groups of animals in the closed cycle of growing are in the farms. Searches had been begun on the study of the condition of animals in the matrix immediately after farrowing; in a number of farms, hypo- and agalactia were detected. The pigs received less milk from the sow, diarrhea had begun, they quickly became worse and died. Among the causes of low milk production, obesity of sows, the presence of endometritis and mastitis in them, significant fluctuations in the temperature in the mother liquor, old and depleted animals, protein deficiency in the diet, and so on.

Most often, animals were sick with gastroenterocolitis in small farms with traditional pig production technology on the concrete floor in the absence of the system «empty-occupied». The incidence of colitis, ilite and dysentery was significantly lower in the «Demis Agro» farm, where in the livestock buildings there is a system of «empty-occupied», regular disinfection, preventive measures and rational treatment of piglets and sows are applied, automatic temperature and ventilation are carried out.

Instead, in small farms with a lack of rhythm of movement of the livestock, lack of workshops by technological and age groups; systematic violations of the parameters of the microclimate, unsystematic treatment, untimely and insufficient supply of the holding effective drugs contributed to frequent outbreaks of infection.

Among the piglets at weaning were also observed diarrhea of colibacillous nature. Simultaneously, cases of edematous disease were recorded, which reached the maximum in the process of transferring piglets from pre-starter to starter fodder. In 2–3 weeks, the morbidity of colibacillosis become obliterated and signs of dysentery, sometimes illeitis, are appeared. First of all, this picture is related to the feeding of animals of non-standard cereal feeds, afflicted with mycotoxins, or those containing components that damage the mucous wall of the digestive canal. This was confirmed by the results of chemical and toxicological searches.

Characteristic clinical signs of dysentery appeared on the raising of piglets after the 45–50th day of life and, under adverse circumstances, accompanied the animals before slaughter at the meat-packing plant at the age of 160–180 days. The main clinical signs were the inhibition of sick piglets, loss of appetite, diarrhea of aqueous consistency, an unpleasant smell at the beginning of the disease, and in the future – profuse diarrhea with admixture of mucus and blood in faeces. There were signs of dehydration of animals, enoftalm, totter, depression and progressive weight loss, which led to lagging growth and death. In some farms, there were clinical signs of ileitis,

which observed a characteristic staining of feces in gray. The consistency of feces varies from watery to creamy.

In more adult animals, with no marked signs of digestive disorders, there was a decrease in weight and lag in growth. The body temperature of animals was within the normal range, and sometimes decreased to 37 °C.

*Pathoanatomical changes* at autopsy varied from insignificant weight loss to the extreme degree of cachexia. There were also signs of dehydration and intoxication of the body caused by inflammatory processes in the gastrointestinal tract, characterized by the occurrence of stagnation of blood in a small circle of blood circulation and heart muscle dystrophy. Congestive phenomena were developed in the lungs, which contributed to the development of pathogenic flora in the respiratory system and caused inflammation of the lungs.

Dystrophic phenomena were noticed in the liver and kidneys on the background of congestive hyperemia. Nonspecific changes were characterized by pathpicture and in the spleen. Some increase of the organ was due to systemic circulation disorder. The spleen had a dark red color, a stagnant consistency, the edges somewhat dull, the scab is small.

Typical for colibacteriosis pathoanatomical changes in the stomach, thin intestine of the intestine are found: swelling, hyperemia, swelling of the wall (Fig. 1).



Fig. 1. Erosive gastroenteritis with colibacillosis

Stomachs of piglets up to the 1st month filled with casein convolutions, in 2-month olds – a large volume of dry forage masses of porridge-like consistency, mucous membrane of the stomach of dark brown color, edema, with hemorrhages – acute erosive-ulcerative gastritis.

In the histological search, the microscopic picture of the mucous membrane of the stomach and intestines was characterized by inflammation and desquamation of the integumentary and glandular epithelium with the formation of erosions and ulcers, congestive hyperemia of the blood vessels. Serous coverings are infiltrated with erythrocytes, leukocytes and histiocytes. The vessels of the mucous membrane are dilated, filled with erythrocytes, and mucous membranes are infiltrated with erythrocytes, neutrophils and macrophages. Thus, changes in the stomach and thin intestine of piglets with colibacteriosis of are characteristic of acute erosive ulcerative inflammation.

For edema, angiopathy of the arterioles of the micro-circulation channel should be noted, accompanied by mucoid swelling of their walls.

Specific pathoanatomical signs of dysentery were found predominantly in the large intestine (Fig. 2).



Fig. 2. Macroscopic picture of dysentery

From the side of the serous cover, large intestine - dark red color, stands out against the background of hardly hyperemic small intestine. Between the intestinal loops in acute cases, sometimes there were thin fibers of fibrin. The contents of the large intestine are rarefied, with admixture of blood, mucus, fibrin. Mucous membrane of the stomach and intestines is swollen, vitreous, dark brown color, with noticeable erosions. Regional mesentery nodules in the state of serous edema, with significant vascular hyperemia. On histopreparations with lesions of the large intestine, necrotic events were observed in the surface layers of the mucous membrane, congestive hyperemia and swelling of the submucosal membrane, infiltration of red blood cells and neutrophils.

Sometimes the emptying of pigs was grayish-black, which corresponded to the picture of ileitis (proliferative enteropathy) (Pejsak, 2012), which was characterized by erosion, inflammation and even hyperplastic growth of the ulcer of the mucous membrane of the ileum and large intestine (Fig. 3).



Fig. 3. Emptying with ileitis

In fig. 3 we see ilite feces of a characteristic color of the creamy consistency. In some farms from time to time among adult animals, there have been singles cases of sudden death of piglets. The corpses for several hours, decomposed with signs of intense bloating (corpse em-

physema). By autopsy there was a picture of hemorrhagic-necrotic colitis, sometimes – enterocolitis.



Fig. 4. Hemorrhagic-necrotic enterocolitis

In fig. 4 we see the hemorrhagic-necrotic colitis caused by clostridia. Treatment of these animals was ineffective. The number of such cases began to increase due to the deterioration of the quality of the grain group and in the absence of mycotoxin sorbents-in-feeds.

*Treatment and prevention schemes.* The analysis of veterinary measures carried out on farms showed a lack of a systematic approach to the treatment of factor infections. This was especially true for small farms, which attracted attention to the limited range of antibiotics, incorrect dosage of drugs, chaotic use of antimicrobial treatments.

By research, we have been compiled a universal scheme of treatment and prevention for suckling piglets and groups of rearing, which included measures against gastroenteritis of different etiologies (Table 1, 2).

Injections of Vetromoxin were used to treat colibacteriosis of the matrix in the piglets. 5% Enroxil was also used to treat, but its effect on the body of newborn piglets is more severe. It was used only in those situations when Vetromoxin did not help.

For the prevention of colibacteriosis in the piglets of piglets matrix, vaccination of the sows with vaccines «Neocolipar» can be carried out, or «Porcilis Coli» 3 weeks before farrowing. For the first time, as well as for repair pigs, the vaccine is used twice – for 3 and 6 weeks before farrowing.

At the weaning and during the transition from the pre-starter to starter fodder, it is proposed to use Colistin 6M in a dose of 500 g per 1 ton of feed or a preistar containing the Colistin. In this case, when transition from a pre-starter to a starter feed that takes place within 3–5 days, Colistin is mixed with starter feed and fed to piglets for 7 days. Piglets with diarrhea at the beginning of treatment in parallel were used Enroxil injectably.

The most effective preparation in the treatment of dysentery and ilite in our search was the injectable preparation Tiamovet.

Its use quickly stopped diarrhea, both dysentery and ilite origin. For an increase in the number of piglets with signs of these diseases above 20 percent were introduced group treatment of Tiamulin powder in the feed. Dosage was carried out at the rate of 18 mg of active substance per 1 kg of live weight of the body of animals.

**Table 1**  
Scheme of preventive measures for suckling piglets

Day of life	Type of processing	Preparation	Dosage
First	Cure the fangs, cutting off tails	-	-
Third	Prevention of coccidiosis	Sevazuril	0.9 ml – for 1 point, internally
	Prevention of iron deficiency	Bioferon	2 ml – for 1 point, i/m
	Castration	PVP iodine	0.5 ml – for 1 point, externally
	For the occurrence of diarrhea in piglets:		
	I/m injection for all animals	Vetromoxin LA	At 0.5–1.0 ml (depending on live weight)
	In the absence of effect when using Vetromoxin:		
	I/m injection for all animals	Enroxil 10%	1 ml per 15 kg of live weight – not less than 3 days
	Vitaminization of backward piglets:		
	i/m injection	Oligovit or Duphallit	At 0.5–1.0 ml (depending on weight)

**Table 2**  
Scheme of treatment and prophylaxis measures for piglets of the group of rearing

Day of life	Type of processing	Preparation	Dosage
42–47 (transition from the pre-start to the start feed)	Prophylaxis of digestive system diseases	Colistin 6M	500 g/t feed
65th	Dehelminthisation	Fenbendazole 5.5%	1.8 g/10 kg of live weight
	For yellow diarrhea and edema:		
	i/m injection	Enroxil 10%	1 ml/15 kg live weight
	For black, watery and bloody diarrhea:		
	i/m injection	Tiamovet	1 ml/15 kg live weight
	Vitaminization of retarded piglets:		
	i/m injection	Multivitamin or Introvit	1 ml/head

It should be noted that in order to prevent the occurrence of factor infections, the main thing is to observe the technological parameters of keeping and animals feeding. Particular attention should be paid to the breeding stock and boars, which may be hidden carriers of various infections and contribute to the circulation of diseases within the complex. In addition, it should be noted that without correction of technological disorders of treatment, even potent drugs, will not be effective, but will only increase the cost of pigs keeping.

### Conclusions

1. Colibacteriosis of piglets is most pronounced in pig farms with traditional cultivation technology on concrete floors. This is facilitated by the absence of a system of «empty-occupied», incorrect schemes of treatment and prevention, non-compliance with the disinfection regime of premises.

2. The appearance of the first clinical signs of dysentery and ileitis occurs 3–4 weeks after the piglets are transplanted from pre-starter mixed fodder to the starting one. The causes of exacerbation of infections include the poor quality of the cereal group affected by mycotoxins; violation of the technology of grain grinding; delays in animals feeding. The most aggressive of these infections was in the conditions of a deep unchanging litter, where from time to time there was a violation of one-stage animal setting and the lack of straw litter.

3. Characteristic in the pathoanatomical picture of colibacillosis of piglets was erosive-ulcerative gastroenteritis; for dysentery – catarrhal and hemorrhagic colitis; for ileitis – proliferative ileitis and colitis; for clostridiosis – hemorrhagic-necrotic colitis. Changes in

other organs were nonspecific and similar: congestive hyperemia and dystrophy of parenchymal organs, myocardial dystrophy, signs of general depletion and dehydration of corpses.

4. Veterinary preventive schemes for pig farms and complexes must necessarily include measures that improve the course of critical periods of the technological cycle and prevent diseases of the gastroenteritis. In the treatment of colibacteriosis, the most effective were drugs Kolistyn, Vetrymoxine, Enroxil; dysentery and ileitis – powdered and injectable Tiamulin.

5. The main attention should be paid to the prevention of factor infections: the provision of animals with complete balanced feeds, to control the quality of their grain group, to improve the conditions of containment and general stabilization of the veterinary and sanitary state of the economy.

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