

## CLINICAL AND PARACLINICAL STUDIES IN ENZOOTIC PNEUMONIA IN INDUSTRIAL SWINE-BREEDING OF BULGARIA

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### **Abstract**

*Two licensed industrial pig farms from different regions of Bulgaria, with laboratory confirmed enzootic pneumonia had clinical and hematological studies. In the study farms the disease occurs in acute and subclinical form. According to the severity of clinical signs studied pigs were grouped into treatment groups. Of all pigs in the group were taken into sterile blood samples for paraclinical study. The results showed changes in red blood cell (eritropeniya, hemoglobinopeniya and decrease in hematocrit) in the white blood cell count (leukopenia, lymphopenia and eozinofilopeniya) and biochemical parameters (hypoproteinaemia, hypoalbuminaemia and hyperglycaemia) of experimental pigs.*

*Key words: swine, enzootic pneumonia, clinical and paraclinical studies.*

### **INTRODUCTION**

In the industrial swine breeding, despite of the used technologies and the herd size, the respiratory diseases are a current problem (Ganovski and Dinev, 1996). Most frequently they flow as a polyethiologic, mixed or associated infections. The structure of the swine respiratory disease became extremely complicated especially after the occurrence of the Porcine Respiratory and Reproductive syndrome (PRRS) and the Porcine Circovirus disease (PCVD). On this occasion was created the definition – Porcine respiratory disease complex (PRDC) (Motovski, 2003; Bochev, 2007). One of the most important pathologic agents in PRDC that affects the epithelial cells of the respiratory tract and disturbs the function of the lymphoid system is *Mycoplasma hyopneumoniae* (*M. hyopneumoniae*, *M. hyo*) (Stipcovic, 2001; Opriessing et al., 2004; Thacker, 2006).

*M. hyopneumoniae* cause the swine enzootic pneumonia (EP). Being one of the most widely distributed chronic respiratory diseases in swine, it cause big economic losses in the global swine-breeding. The losses

proceed from the poor forage assimilation, retarded growth, high morbidity and mortality, casualty and prevention expenses and therapy (Georgakis et al., 2002; Maes et al., 2008).

A typical clinical sign for EP is the chronic paroxysmal nonproductive (dry) cough. It occurs mainly in the morning when the pigs move during feeding time. The cough is accompanied by fever, serous leaks from the nose, serous-purulent conjunctivitis, skin paling, bristle shagging, kyphosis, poor forage assimilation, reduction of the average daily gain and growth retarding (Morris et al., 1994; Sibila et al., 2009; Tazayan, 2009). The affected pigs reveal changes in hematologic and biochemical blood samples. In the red blood count there is erythropenia, low haemoglobin and haematocrit. The leucogram in *M. hyo* induced EP shows leucopenia, eosinopenia, lymphopenia and monocytopenia. The biochemical changes are related with hypoproteinemia and hyperglycemia (Tazayan, 2009).

The goal of the following work is to study the clinical forms and signs, hematologic and biochemical changes in the blood of the

pigs infected with *M. hyo* in the industrial swine-breeding farms in Bulgaria

## MATERIALS AND METHODS

### *Animals used in the research*

The research is conducted with 60 local Bulgarian pigs (2 month old, males), showing signs of respiratory disease. They are from 2 different industrial swine-breeding farms. The pigs were divided in 3 groups according to their clinical status and the laboratory results. The control group included 20 pigs from both farms (10 pigs from each farm), clinically healthy and with negative serological results. Group 1 included 10 pigs from each farm with acute form of the disease and positive serological results for *M. hyo*. Group 2 was also composed by 10 pigs from the one and 10 pigs from the other farm. The pigs from group 2 were without clinical signs but showed positive ELISA results.

### *Analytical methods*

From all of the pigs were obtained venous blood samples from the orbital sinus. All the samples were examined for hematological parameters (erythrocyte count, hemoglobin concentration, hematocrit, leukocyte count, lymphocyte, MID, thrombocyte count) and biochemical parameters (total protein, albumin, blood sugar, urea, total bilirubin). The hematological parameters (RBC, HGB, PCV, WBC, LYM, MID, PLT) were determined in whole blood with automatic hematological counter Hema Screen, Germany. The biochemical parameters were determined with tests from the company Human-Germany and semiautomatic biochemical counter Screen Master, Hospitex Germany.

### *Serological methods*

From all of the pigs were obtained sterile blood samples (serum) and checked for the presence of specific antibodies against *M. hyopneumoniae* glycoprotein 74 KDa with blocking ELISA of the Oxoid company.

### *Statistics*

All of the obtained data was processed with software for statistical processing and graphics StatMost32

## RESULTS AND DISCUSSIONS

During our research we found wide spectrum of clinical signs in both swine-breeding farms for the period from the 1<sup>st</sup> to the 14<sup>th</sup> day using routine veterinary clinical methods. All swine categories were affected from the disease, but the clinical signs were most prominent in the growing pigs.

Analyzing the data from our research we came to the conclusion that according to the severity of the clinical signs there are two clinical forms of the disease: acute and subclinical.

The course of the acute form of EP is with body temperature raise between 40.5 and 40.8° C in all affected pigs. The fever was accompanied also with serous-purulent conjunctivitis and slight dry cough. In some individuals we observed breathing difficulties manifested with “sitting dog” posture. The affected animals were distinctly weaker than the other animals, anemic and lethargic.

In the subclinical form pigs look clinically healthy, without fever and respiratory disturbances, but with anorexia, poor forage assimilation, rapidly wasting and growth retarding. Examination of blood samples from these animals with blocking ELISA showed specific antibodies against *M. hyo*.

The pig's clinical response is complex and depends not only from the field strain of *M. hyo* but also from the microclimate in the farm. None of the described clinical signs is pathognomic for EP which requires a differential diagnosis with PRRS, PCVD, AD and APP. The results from our clinical study on the course of EP were for the most part similar with these accomplished by Morris et al. (1994), Sibila et al. (2009) and Tazayan (2009).

The results of hematological tests on pigs of different clinical forms of EP from two farms are shown in Tables 1 and 2.

Table 1. Hematological profile in weaners pigs originating from pig farm A

Parameter	Tested material	Unit of measurement	Control group (n=10)	I test group (n=10)	II test group (n=10)
1. Erythrocytes – RBC	blood	10 <sup>12</sup> /l	6.81±0.79	4.04±0.22	4.47±0.34
2. Hemoglobin – HGB	blood	g/l	111.60±7.30	74.10±6.22	90.10±4.28
3. Hematocrit – PCV	blood	%	38.34±2.79	27.15±1.05	29.27±0.77
4. MCV	blood	fl	55.37±1.92	42.15±1.89	46.16±2.04
5. MCH	blood	pg	17.37±0.79	12.09±1.03	15.35±0.58
6. MCHC	blood	g/l	299.60±12.12	264.40±7.18	278.00±5.71
7. Leukocytes – WBC	blood	10 <sup>9</sup> /l	18.61±2.76	8.05±0.85	9.30±0.76
8. Lymphocyte – LYM	blood	%	45.97±3.74	23.60±2.08	26.31±2.57
9. MID (MO+EOS+BASO)	blood	%	18.34±1.24	5.39±0.98	7.55±0.51
10. Thrombocytes - PLT	blood	10 <sup>9</sup> /l	497.10±179.24	183.40±16.67	226.50±11.00

Table 2. Hematological profile in weaners pigs originating from pig farm B

Parameter	Tested material	Unit of measurement	Control group (n=10)	I test group (n=10)	II test group (n=10)
1. Erythrocytes – RBC	blood	10 <sup>12</sup> /l	6.20±0.23	3.69±0.89	4.39±0.53
2. Hemoglobin – HGB	blood	g/l	109.30±6.27	62.20±18.82	83.00±7.71
3. Hematocrit – PCV	blood	%	37.47±5.60	25.64±3.50	30.61±0.76
4. MCV	blood	fl	54.50±5.46	41.10±4.53	46.70±3.40
5. MCH	blood	pg	15.33±0.61	9.75±1.71	13.77±0.80
6. MCHC	blood	g/l	260.00±6.49	227.80±24.27	255.90±7.75
7. Leukocytes – WBC	blood	10 <sup>9</sup> /l	17.59±2.86	7.49±1.68	9.86±0.65
8. Lymphocyte – LYM	blood	%	49.28±4.54	23.12±2.34	29.20±1.98
9. MID (MO+EOS+BASO)	blood	%	18.34±1.45	6.52±0.49	7.67±0.52
10. Thrombocytes - PLT	blood	10 <sup>9</sup> /l	423.30±61.47	162.80±26.04	293.30±53.14

The data show in two tables, it is clear that in pigs affected by acute and sub-clinical disease, decrease in the total number of erythrocytes, as compared with the control group. Similar trends are observed in the indicators hemoglobin and hematocrit. Changes were also seen in the white blood count. In the first and second experimental

groups, the leukocyte count and the percentage of the lymphocytes were reduced, compared with the control pigs. Platelet count is increased in the control group compared to the test. Our results show changes in some of the studied biochemical parameters, which are shown in Tables 3 and 4.

Table 3. Biochemical profile in weaners pigs originating from pig farm A

Parameter	Tested material	Unit of measurement	Control group (n=10)	I test group (n=10)	II test group (n=10)
1. Total Protein – TP	serum	g/l	80.20±2.68	55.10±2.51	66.17±3.61
2. Albumin	serum	g/l	29.10±5.13	17.42±0.36	17.81±0.64
3. Glucose	serum	mmol/l	3.71±0.91	8.66±0.45	4.95±0.49
4. Blood Urea	serum	mmol/l	7.55±0.49	5.48±0.33	6.04±0.89
5. Bilirubin Total - T Bili	serum	µmol/l	5.26±0.51	1.78±1.10	4.38±0.53

Table 4. Biochemical profile in weaners pigs originating from pig farm B

Parameter	Tested material	Unit of measurement	Control group (n=10)	I test group (n=10)	II test group (n=10)
1. Total Protein – TP	serum	g/l	79.18±3.07	54.46±6.48	70.24±2.80
2. Albumin	serum	g/l	25.99±3.69	17.88±0.97	21.94±1.81
3. Glucose	serum	mmol/l	5.82±0.38	7.72±0.62	5.08±0.50
4. Blood Urea	serum	mmol/l	9.21±2.11	5.30±0.55	7.94±0.96
5. Bilirubin Total - T Bili	serum	µmol/l	11.74±1.79	11.84±1.92	9.61±1.12

The data in the tables show that the total protein and albumin levels are decreased in patients with EP pigs, as compared to healthy pigs and the blood glucose level is elevated in pigs affected by the acute form of the disease. The results of paraclinical examinations in the present study correspond to the findings of Tazayan (2009), which proves eritropeniya, decreased hemoglobin and hematocrit, leucopenia accompanied by lymphopenia, hypoproteinaemia, hypoalbuminaemia and hyperglycaemia in pigs affected by the EP.

## CONCLUSIONS

Finally, we assume that in the investigated industrial pig farms in Bulgaria, enzootic pneumonia occurs most frequently in acute and subclinical form, with significant changes in haematological and biochemical blood values between sick and healthy pigs

## ACKNOWLEDGEMENTS

This research work was carried out with the support of University of Forestry and project BG051PO001-3.3.06-0056 "Support for the development of young people in University of Forestry", Operational Programme "Human Resources Development" financed by the European Social Fund of the European Union.

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