

ABSTRACT

Researches regarding porcine respiratory and reproductive syndrome (*PRRS*)

The outstanding development of the biological sciences and medical one led to an unprecedented extent of intensive breeding systems. These facts demand solutions and reconsidering the old conceptions regarding rapid livestock growth and health.

In present we poses the knowledge's which applied rightfully can ensure swine health. Is not enough to poses these data, it is imperiously to gain the reality established by them.

In spite of modern technology, management techniques, proper health program, each breeder is confronted with the Porcine Reproductive and Respiratory Syndrome, a disease complex represented by an interaction between viruses, bacteria, suppressed immune system and stress.

Rarely this diseases complex can be induced by a single pathogen; usually we speak about a multifactorally pathology, which includes bacteria (*Mycoplasma hyopneumoniae*; *Pasteurella multocida*; *Actinobacillus pleuropneumoniae*) and viruses (Aujeszky virus, *PRRS* virus, influenza virus, respiratory coronavirus).

The doctoral thesis holds 261 pages, being redacted in eleven chapters and structured considering the actual criteria in two parts, first one (contains chapters I-IV) represents the main bibliographic data synthesis regarding *PRRS* and constitutes "knowledge's actual stage".

Second part refers to own researches. Each chapter from second part encloses references to material and method, results, discussions on results and partial conclusions.

This work is illustrated with 135 figures, 38 tables and is based on 339 bibliographic indices.

First part represents a synthesis on the literature regarding *PRRS*, with accent on etiopathogenetic mechanisms and actual stage of global research.

In first chapter are presented the available data on history and etiology of the Porcine Reproductive and Respiratory Syndrome. Are revised facts as occurrence, importance, taxonomy, morphology, replication and characteristics of virus develop.

Second chapter presents epidemiology and pathogenesis of Porcine Reproductive and Respiratory Syndrome Virus. Were revised receptivity, sources, infection route, virus disseminating path, viral infection presence and pathogenesis in different age classes.

Third chapter introduces the symptomatology and **PRRS** virus pathogenesis. Are presented, clinical signs considering evolution form and lesions aspect (macroscopically and microscopically).

Fourth chapter discusses diagnostic methodology, prophylaxis, and syndrome combating methods.

Is presented presumption diagnostic and laboratory exams regarding antibody isolation, antigen evidencing, virus detection, and virus strain identify. Besides were discussed general and specific prophylactic measures.

Premises which lead to own research were linked to presence and prevalence of respiratory and reproduction syndrome recently signaled in swine farms, were considered some of the epidemiologic, clinic and diagnostic particularities.

The second part holds six chapters and follows the presence and prevalence of **PRRS** in swine farms (chapter V), epidemiologic and clinical studies in an episode of porcine reproduction and respiratory syndrome (chapter VI), morphopathologic findings in this syndrome (chapter VII), researches regarding serological diagnostic significance (chapter VIII), researches regarding **PRRS** economical impact (chapter IX).

In ten chapter are synthesized the final conclusions, facts that outcome epidemiological, clinical, morphopathological and serological researches.

The results are different depending geographical area, location of the farms, samples collecting time line, in this order of speech from the total of 10774 samples only 4337 (40.26%) were positive and the rest of 6437 (59.74%) were negative, from the point of distribution pattern the samples identified as positive are present all over Romania. The highest number of serological identified animals as positive was registered in Transilvania (40.15%%), Dobrogea (56.83%%) and the lowest is recorded in Muntenia (39.76%) and Moldavia (36.06 %). The dynamics of the disease, ascendant number of positive samples, can be explained by illegal circulation of animals from, initially highly contaminated region of, Transilvania to eastern farms.

The low amount in positive cases from Moldavia (36.06 %) and Muntenia (39.76%) compared to highly positive farms from Transilvania (40.15%%) and Dobrogea (56.83%%) can be explained by geographic remote position of the farms, and reduced animal exchange.

Seropositive reactions incidence differs considering year of collection and geographic distribution. The highest number of positive samples were recorded during year 2006 when the serological exam of 4764 samples from farms located in all four regions indicated 2284 positive

individuals (an incidence of 47,94%); the lowest incidence were recorded during year 2007 with a value of 14,82% of positive samples.

Positive results rise during 2006, 47.94% positive samples, in comparison with year 2005, 36.47% positive samples, can be explained by maintaining infected individuals in reproduction effectives. Actually the precise mechanism in a viral infection isn't fully understood but an important role is played by viral infective dose. Must be considered the fact that the farms were at the first infection when the samples were collected, in order to perform the serological exam, and the released virus quantity was massive, fact that favored infection in a big receptive animal group.

Less serological reactions were recorded during year 2007, fact explained by seropositive individual's removal from reproduction. During this year were examined 641 samples from which only 95 positive (14, 82%) and 546 negative (85, 18%).

Another reason for case number reduction can be the chronic aspect of the infection, when the viral infections diminish; the infective doses are lower, allowing an asymptomatic viral passage. This kind of passage doesn't attend farmers about virus presence.

Epidemiological, clinical and laboratory researches presented in chapter VI were conducted on an effective of 81117 individuals (a Commercial Complex from Moldavia), constituted in seven age categories. The first cases appeared in a reproduction farm with animals acquired without a preventive serological exam regarding porcine respiratory and reproduction syndrome.

Because the first appearance was in a reproduction effective can be appreciated the fact that the newly introduced animals were the source of the infection; the main route of infection is represented by the direct contact between diseased animals and receptive one. Moreover acquiring diseased animals and introducing them in effectives with receptive animals can induce clinical manifestations or reactivate the viral activity in animals with chronic infection.

From the 81117 animals present in the complex, get diseased 32028 individuals (with a morbidity of 39,48%). The morbidity percent differs with age category, the highest percent was recorded in weaned piglets 21.864 (39,98%), followed by piglets delivered on term 5.746 (48,99%), shows and gilts 4.297 (29,91%) and finally the less affected category boars with 121 (34,77%) diseased individuals.

The raised percentage of diseased individuals in piglets and weaned piglets can be explained by the fact that passive immunity transferred from the shows offers protection for a narrow period. In support of this observation comes Albina E., who testifies the fact that piglets become sensitive to

infection, with Porcine respiratory and reproduction syndrome virus, at age of 4-10 weeks, once the specific antibodies are cast out from organism.

The risen of the morbidity and all age categories involvement is explained by the fact that complex was free of disease prior **PRRS** virus emergence. Concerning evolution, its gravity, its significance, an important role is played by infective viral dose. In farms affected for the first time by infection, virus quantity is significant and facilitates an extent contamination among all receptive animals, a high morbidity percent.

The clinical exam evidenced a variable expression considering age groups. Likewise in clinical evolution were distinguished two components respiratory and reproductive.

The first disease signs were signaled in reproduction boars used for artificial insemination; the boars presented inappetence, fever in 15% of cases, libido decrease, decreased sperm quality (90% of spermatozoa were not viable, many presented abnormalities).

In shows and reproduction gilts the symptoms recorded in observation charts were: inappetence, lameness, hyperthermia, dyspnea, abortion, stillborn piglets, dystocia, agalaxia, lactation problems, ears, teat (nipple) and vulva cyanosis. Clinical evolution lasted about forty days, period with abortion rise, and bacterial complications after abortion, were recorded also mummified piglets.

In piglets born at the term we observed: insufficient body gain, reduced vitality, mortality increased in the first week of life, ear and eye lids edema, melena with feces colored in dark grey, bleeding after tail removal.

In piglets older than 5-14 days we noticed: general status change, weakness, decreased viability, pale skin and mucosa, eye lid edema, dispnea, diarrhea appear after 3-5 days from disease onset. Weaned piglets presented at the beginning hyperthermia, weakness, and respiratory affections.

Researches regarding macroscopically modifications (chapter seven), implicated direct examination of 738 pigs (135 shows, 175 piglets stillborn or mummified, 115 piglets before weaning, 110 piglets after weaning, 200 fat pigs, 3 boars), these animals presented lesions which are not overlaid completely on specialty literature, there are new elements in **PRRS** pathogenesis.

To the exterior exam the corpses presented a good body shape, with posterior part (in piglets) dirty with liquid feces, and cadaver rigidity installed. Opened corpses presented lesions in concordance with clinical symptomatology, fact that demanded furthermore separate analysis on age categories and organ lesion.

Microscopically examination (chapter 7.2) was realized on samples collected from 30 shows and 25 piglets before weaning; this supplemental exam revealed pathological aspects regarding estral cycle and particular aspects bounded to viral action. At ovarian level were observed specific elements of the ovarian cycle, follicles in various unfolding stages up to corpora luteum. In the shows with prolonged anestrus (up to 45 days) or heat repeat at 21 days, the ovaries presented a cystic degenerative process.

At the uterine level, the specific structural elements of the endometrium were approximately normal; changes were observed mainly in blood vessel, especially in arteries no matter caliber; frequent was present the vessels edema, subsequently being noticed perivascular lacuna, followed by dilaceration of the glandular epithelium.

Similar lesions were observed in other tissues: lung, trachea, lymph nodes, spleen, liver, tonsils.

The serological determinations were done on samples gathered from farms with different epidemiologically situations. From 427 samples (samples harvested from different swine categories) 224 reacted positive (52, 46%) and 203 were negative (47, 54%).

The results differ considering collecting moment, 100% negative before disease emergence, 66, 87% after disease appearance. The results differs with age group, 100% negative in shows and youth in both farm A and B prior disease outburst, after infection were seropositive 75% of the shows in farm A and 92,5% weaned piglets from farm B.

The serological exam, for epidemiological surveillance done on 1604 samples (selection farms) during years 2005-2006, shown only negative reactions, indifferent of age. Instead serological investigations using competitive enzymatic immune assay, on samples, from farms populated with import animals, same period, evidenced 678 positive reactions and 2882 negative one. From the researches can be appreciated the fact that competitive ELISA serological surveillance is more sensitive, and presents a more accurate specificity, so it is proper for serological surveillance.

The immunofluorescence assay used to exam 245 samples evidenced 32 positive reactions (31.1%) and 213 negative one (86.9%). Presence of **PRRS** antibodies was evidenced in pregnant shows 25,5% (14 positive samples of 55), and in 70-80 days old youth in a percent of 22.5% (18 positive samples of 80).

Searching in parallel 81 samples using both methods reveals the fact that competitive enzymatic immune assay is more sensitive (71, 60%) than immunofluorescence assay (61,72%).

These two methods can be used to diagnose **PRRS** because are sensitive and specific enough, demand a low quantity of reactive and allows a quick response.

During one year period, from January 2006 till January 2007, we initiated a study regarding economical impact of **PRRS** on an effective of 4700 shows and gilts, this study evidenced the fact that natality and prolificacy indices drop, can be observed a rise in returnees to heat.

The natality values prior disease are higher (values between 66,6-71%) than during disease episode (when are recorded values between 55,5-66,2%). Returnees to heat are more frequent with a value of 21,44%, higher than initial value 11,25%, prior to disease outburst.

Prolificacy during disease recorded lower values (7.14) than those prior infection (9.5 value registered before **PRRS** diagnostic).

Considering different pathological entities and mortality dynamics, we were able to differentiate during disease episode, two distinct evolution periods (1.01. 2006- 30.08. 2006; 1.09.2006-31.01. 2007).

Body weight gain recorded a decrease with 15,5 g in youth and 152,2 g in fat pigs. These facts demonstrate a low forage conversion and an abrupt climb in animal slaughter; phenomenon indicating the significance of the economical impact of this disease.