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Ascariasis in pigs, diagnose and alternative

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Abstract

Qualitative and quantitative examinations on the prevalence and parasitic load values of *Ascaris suum* infection was realized in the stools, nasal secretions, liver and lungs in all pig categories. Epidemiological coproscopy results showed that the most affected category are piglets 0-3 months (90% of heads and average parasitic load 142 e/g/f). Piglets category 3-7 months resulted in 71.9% and average parasitic load 184 e/g/f. Coproscopy examinations are efficient and offer the possibility of epidemiological estimates, while post-mortem examinations in slaughterhouses are efficient, low cost and provide sufficient data for *Ascaris suum* infection. Post mortem examinations to the slaughterhouse were alternative methods of study. In piglets, we examined nasal and lung secretions for the presence and number of larvae. This method was applied as an alternative examinations method. Especially in piglets became careful clinical observation for signs of pneumonia and when parasitic pneumonia detected, the nose leaks were examined for the presence and number of larvae. Efficient alternative diagnostic techniques for *Ascaris suum* infection diagnosis used as comparative testing and are made in all pig farms in all the territory of the country. These methods used and converted into routine techniques to perform qualitative and quantitative diagnosis and other *Ascaris suum* infection estimates.

Keywords: *Ascaris suum*; infection; pigs; method; estimates.

1. Introduction

Ascaris suum is known as the big ascarid of swines [2]. *Ascaris suum* is a parasitic nematode, which causes swine ascariasis. Ascariasis is zoonosis because *Ascaris suum* also infest people [3, 6]. *Ascaris suum* is widespread all over the world and might go up to 40 cm long. Infestations by *Ascaris suum* are medicated and prevented by means of ascarids. *Ascaris suum* is a representative of the family Ascarididae and one of the most maleficent parasites in swines, especially in piglets. Its biological cycle is direct, but it might also be developed through paratenic hosts [1, 9, 13]. Pigs, especially piglets are infested with L2 through food or water. Larva through hepatic migration comes back to the liver in L3 and by means of blood circulation it reaches the liver and goes down to the alveoli. This process is known as the phase of hepatic-tracheal migration, which by swallowing goes down to the intestines, where it settles and 2 months after infestation is transformed into a grown nematode [4, 7]. The male parasite is from 15 cm up to 31 cm long and from 2 mm up to 4 mm wide. Their end is curved and terminates in a thin tail. They have simple spicules from 2.0 mm up to 3.5 mm long. Females are bigger than males and might go from 20 to 49 cm long, with a diameter 3 to 6 mm [2, 3, 4, 7, 9, 13]. In pigs, *Ascaris* is the most common parasite in Albania with a prevalence of more than 50%. Pigs with ascariasis have lesions in liver and lungs, the latter causing a predisposition to viral and bacterial infections [2, 8]. Ascariasis is traditionally being controlled by mass therapy with anthelmintics. Despite the high efficacy of these products, the long-term effect of the anthelmintics is disappointing and the problem with ascariosis is actually increasing. The most important reason for this is the prodigious fecundity of *Ascaris* and the ability of eggs to survive for long periods of time in the environment [4]. This results in a high environmental contamination and rapid reinfection.

Eggs have an elliptic form 45 up to 75 µm long and a diameter 35 up to 50 µ. In the environment they are transformed into invasive larvas and they infest swines, especially piglets 0-7 months old [2, 3, 12, 15]. Reduction in the productivity of swines is the main characteristic of ascaridiasis, the clinical signs are attributed to the number of parasites, which colonize the digestive system having as characteristic milk spots and verminous bronchopneumonia, which is especially expressed into piglets [14, 16]. Swines comprise one of the most important income from farming in Albania. In Central and Southern Albania swines are generally kept in intensive conditions, while in the north of the country they still continue the extensive swine growth, but with a tendency to transform them into intensive economies [2, 4].

2. Material and Methods

We examined samples taken throughout the whole territory by means of coproscopic method. The fecal samples were taken individually in sows, pre-sows, and uncastrated pigs, while the samples in the piglets category were fecal samples of stables or padoks [11, 17]. The qualitative and quantitative sedimentation, the technique of swimming with the dip full of NaCl of the salt of ZnCl2 was the coproscopic method used in the study [4]. To evaluate the parasitic load we applied the Mc Master technique [2, 11, 17]. The samples were taken 50 gr for the individual samples and 150 gr for the collective ones [11]. They were transported and preserved in containers and were generally examined within 24 hours [4]. In cases when conservation was necessary they were kept in refrigerator at 4 ^{o} degrees C [2, 11, 13].

2.1. Post mortum examinations

Post mortum examinations to the slaughterhouse were alternative methods of study for post mortem animals. In piglets up to three months of leaks nasal examinations for the presence of larvae were applied in testing and comparative level and alternative methods of coproscopic examination especially in piglets up to 3 months [1, 6, 9, 15]. Livers were checked for the presence of milk spots and parasitic bronkopneumonia [2, 4]. All samples (adult parasites, larvae, organs) were preserved in 70 % ethanol [9, 10, 15, 17]. Intestinal worms were measured to the nearest mm. Livers from pigs were examined for superficial liver white spots which were classified as being either of the di use granulation-tissue type or the lymphonodular type [12, 15]. Alternative methods of diagnosis will extend to the entire territory of the country [2, 4]. In pigs from fecal samples were taken and especially in young piglets became especially careful clinical observation for signs of pneumonia and when no nose leaks were examined for the presence of larvae [1, 3, 5, 9, 10].

3. Results and Discussion

The results of the coproscopic observations for the presence and evaluation of parasitic load by *Ascaris suum* are presented detailed according all swine categories. Summary include coproscopic examinations average scores for all categories of pigs on all breeding systems in the whole territory of the country [2, 4]. The results show clearly that *Ascaris suum* is really frequent among swines in our country [2, 4]. It resulted to be present all over the territory with considerable variations among swine categories, different geographical regions and the way of swine breeding [2, 4, 6, 8]. There are regional variations which are often attributed to the hygienic sanitary conditions in stables and the efficiency of executing the dehelminth schemes. In the economies of intensive growth the highest result appeared in the south and north Albania with a prevalence of 84% [2, 4]. While in the other economies the lowest level of the region was in middle Albania with 18%. In intensive economies, excluding the category of uncastrated pigs there is a considerable level of *Ascaris suum* infection [2, 4]. Howeever the riskest category are piglets 3-7 months old where parasitic load varies about 184 e/g/f. Almost the category of the sows to be substituted represents one category with piglets (over

7 months old) gives evidence for an increasing tendency on the parasitic load. This increase goes up to 20%. In sows before farrow there is a parasitic load of about 122 e/g/f (minimum 40-maximum 1200) and this is one of the main reasons of piglet infestation source in stables. The parasitic load for lactation sows resulted 134 v/g/f (minimum 80-maximum 760). We notice a high parasitic load for lactation sows and this explains with the decrease of their condition during lactation and the lack of veterinary care for this category [2, 4].

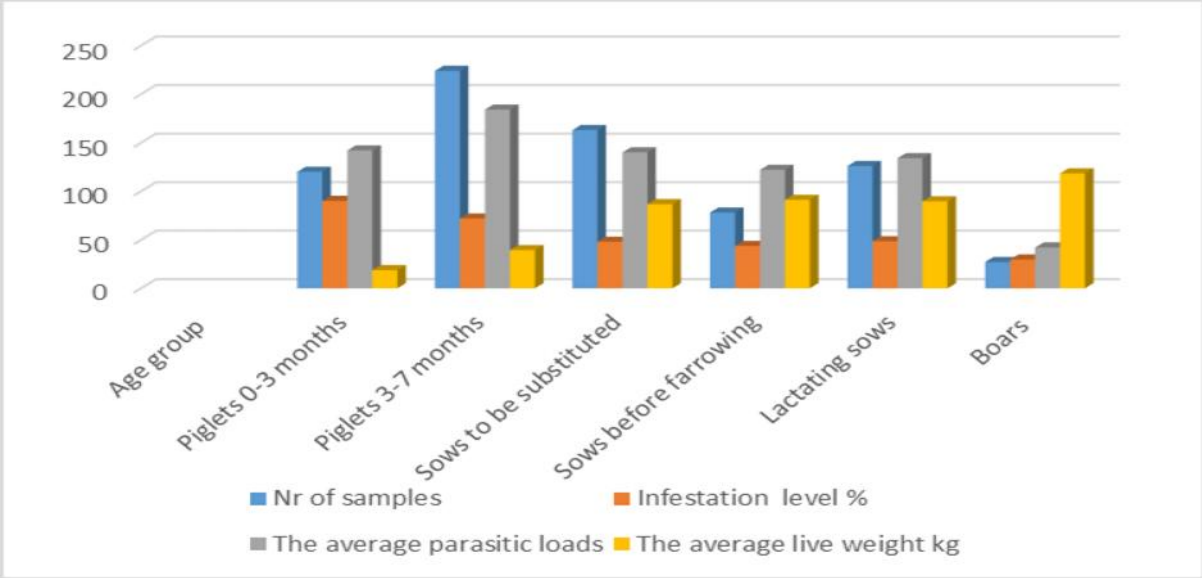

Figure 1. The values of coproscopic examinations.

The coproscopic examinations showed that *Ascaris suum* is really problematic for all swine economies of extensive and intensive growth. Prevalence in the economies of ½ intensive growth in middle (Tirana, Lac untill Lezhe) and North west Albania (Shkodra) resulted respectively 84 and 84%. The highest parasitic load and a prevalence of the level above 90% in the economies of extensive growth, which is still in the level of households severely damages swine productivity [1, 6]. In the north and northeast regions of Albania swine breeding still remains a family tradition, at an empiric level where the main food for swines is the refuse of the family, almost completely without profilactic and medication precautions [8, 13]. In some cases the parasitic load is scary; there have often been found over 1200 e/g/f [2, 4, 11]. In almost all the household economies no dehelminth is applied to sows before farrow.

3.1. Procedures at slaughter and post mortum (alternative) diagnosis.

We did macroscopic observations and sampled the whole digestive apparatus, hepar, lungs and broncioles. The small intestine was cut open, washed in saline, and and faeces and the mucus scraped in microscope. Large *A. suum* were removed before the intestinal contents and the mucus mixture were processed according to the agar-gel technique described by Slotved et al. 1997, modified by incubating the agar-gels for 3 h. For all tracer pigs the entire mixture of contents and mucus was processed [6, 14]. For pigs aged untill 12 weeks, 52 samples was examined. At the slaughter the lungs and broncioles were observed for signs of pneumonia and ascarids larvae were colected and examinated. Intestinal worms were for each pig were colected and measured. Livers from pigs were examined for superficial liver white spots which were classified as being either of the diffuse granulation-tissue type or the lymphonodular type [12]. Coproscopic examinations showed that imported swines resulted to be positive for *Ascaris suum*. We think that the reason

is related to non fulfillment of dehelminth scheme for swines from the economies that import them to our country. The post mortum diagnosis was done for 224 pigs. For the samples we examined macroscopically the content of the intestines and counted L5 of *Ascaris sum*. 46% of the samples resulted positive for *Ascaris suum* in intestines. In 4 samples almost 10% of them counted up to 40 *Ascaris suum* grown within the intestine. In total signs of pneumonia was observed in 62 pigs or 27.67% of heading observed. The highest level of infestation was at piglets 3-7 months,where present signs of pneumonia about 50% of the examined piglets. Interstitial pneumonia lesions correlated to the number of eggs ingested and time of infestation [1, 9]. Thus, they are numerous as the number of eggs ingested by animals is great and finally invasion occurred. In such cases manifest respiratory symptoms (cough and dyspnoea) with petechiae or hemorrhage and accumulation of eosinophils roll larvae [1, 9, 15]. These manifestations are more pronounced when infections are mixed. Hepato-phase migration is very maleficent in piglets. Larvae stage II-pierce intestines and enter the blood vessels (veins), beginning their migration to the liver, where they stay 4-5 days and transformed into L 3 larvae that have come to pass hepatic liver intravenous in v.cava caudalis and the right half of the heart, from which through the pulmonary artery into the lungs reach 4-7 days after infestation [11]. Pierce blood vessels and walls of the alveoli, come in alveoli and begin to climb in the airways, continuing the movement and supported by the device mukociliar, larvae emerge in the pharynx where together with saliva and fluids bronchial swallowed and down to the casing begins intestinal phases [6]. Lung spots were noted in a limited number of pigs. In total around 23% of pigs were noted signs of migration in the liver. Pigs 0-3 months resulted typicaly with lung spots, where 81% of them in the liver presented signs of migration [3, 8, 10, 12]. Piglets 3-7 months resulted in less lung spots (about 13%), while there not noted in other categories of pigs.

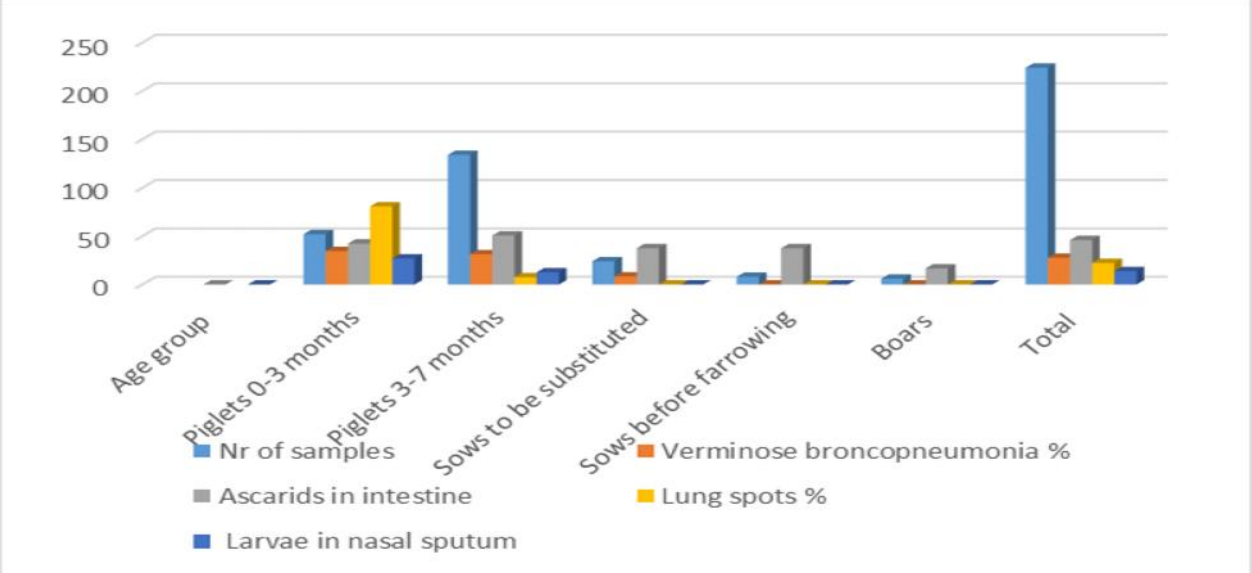

Figure 2. The values of post mortem examinations.

In pigs from fecal samples were taken and especially in young piglets became especially careful clinical observation for signs of pneumonia and when no nose leaks were examined for the presence of larvae [2, 4, 6]. In piglets category up to 3 months they were examined samples of runny nose and resulted positive for the presence of 27% of their larvae. Among those were tampons in their noses and were prepared to microscopic swabs. Swabs were observed in microscopic preparations and stereomicroscopes as wet and dry preparations [2]. In these swabs were found migrating larvae of *A. suum*. The technique proved highly topical given that the larvae appear in infested pig nose on day 7 and 9 after

infestation [2, 4, 13, 16]. Larvae in the nose and mouth to bowel swallowed or come with sneezing or runny nose in the external environment. All samples tested positive for migratory larvae of *A. suum* [4]. Diagnostic techniques proved to be very simple, extremely efficient and very fruitful for the outcome. Work is underway to convert into quantitative techniques to evaluate and estimate the number of larvae and other parasites [4, 6, 13]. With this technique migrating larvae were found in about 13% of piglets 3-7 months, while other categories resulted clean. *A. suum* life lasts about 1 year. *A. suum* exists everywhere where pigs grow and the level of infetimit routine varies, but depending on the conditions of 20-90% [2, 4].

4. Conclusions

Ascaris suum infection is present in all the categories and all over the territory of the country and the most affected category are piglets (untill 3 months 90% prevalence and average parasitic load 142 e/g/f, 3-7 months prevalence 71.9% and parasitic load 184 e/g/f). Coproscopic examinations are efficient and offer the possibility of epidemiological estimates, while post-mortem examinations in slaughterhouses are efficient, low cost and provide sufficient data for *Ascaris suum* infection. Post mortem examinations to the slaughterhouse were alternative methods of study, which remains at preliminary evaluation and comparison. In piglets up to three months we examined nasal secretions as an alternative examinations method. Especially in young piglets became careful clinical observation for signs of pneumonia and when parasitic pneumonia detected, the nose swabs were examined for the presence and number of larvae. Efficient alternative diagnostic techniques as methods of *Ascaris suum* infection diagnosis up to this moment have effect and comparative testing and are made in small numbers and territories, but will extend to the entire territory of the country and will be refined during the full accomplishment of the study. *Ascaris suum* result the helminth highly prevalent in pigs, resulting in significant economic losses. However, due to the subclinical nature of the disease combined with the lack of appropriate diagnostic tools, ascariasis often remains undiagnosed, creating a lack of information regarding the worm-status of a farm. This makes it difficult to evaluate the currently applied deworming programs and the possible economical losses caused by the presence of this parasite on the farm.

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