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Research Article

Ascaris suum Infection Estimate

Healthcare

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Abstract

Ascaris suum infection resulted the more common parasite in pigs, in Albania. Examinations as qualitative or quantitative for the prevalence and parasitic load values of Ascaris suum infection can be performed in the stools, liver, lungs, intestine and nasal sputumin all pig categories. Coproscopic examination was the best metod, more efficient and lower cost to carry out epidemiological studies on the prevalence and parasite load of *Ascaris suum* infection in all pig. Coproscopic examination showed that *Ascaris suum* infection affected all economies and all the pig categories in Albania, but seriously piglets 0-7 months where prevalence resulted very high(around 85%) and average parasitic loads between 142-184 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 evoluation and comparison. In piglets we examined nasal secretions for the presence and number of larvae. This method was applied as an alternative examinations method for coproscopic examination at the alive piglets. Especially in piglets we can observe clinical signs for pneumonia and when parasitic pneumonia detected, the nose leaks were examined for the presence and number of larvae. Efficient alternative diagnostic techniques as methods of *Ascaris suum* infection diagnosis will be converted into routine techniques to perform quantitative and qualitative diagnosis and other parasitic *Ascaris suum* infection estimates.

Introduction

Ascaris suum is the most common helminth in Albanian farm pigs. *Ascaris suum* infection is zoonosis because *Ascaris suum* also infest people. Its larval stagesmay induce economic losses due to liver condemnation, while the adult worms may reduce the growth rate of the pig (Vlaminck J., et al. 2015) and feed conversion (Jungersen, G. 2002). The parasite is transmitted through ingestion of eggs that can develop to infectivity within 4 to 6 weeks during the summer (Jungersen, G. 2002; Mejeret al. 2000) and *Ascaris suum* may remain viable in the environment for a number of years (Stankiewicz, M. 1995). 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. Once ingested by the host, the eggs hatch and larvae migrate through the liver and lungs, before they establish in the small intestine and begin to produce eggs at approximately 6–7 weeks post-infection (Roepstorff, A. 2003). This process is known as the phase of hepatictracheal migration.

Following infection, a self-cure reaction may take place, eliminating the majority of larvae from the small intestine long before they become adults (Stankiewicz, M. at al 1995; Roepstorff A, 2003). The mechanism of this reaction is not known but it maybe the result of an acquired specific immune response. *Ascaris suum* is widespread all over the world and might go up to 40 cm long. *Ascaris suum* is the most common parasite in Albania with a prevalence of more than 50%. Pigs with ascariosis have lesions in liver and lungs, the latter causing a predisposition to viral and bacterial infections. Eggs have an elliptic form 45 up to 75µm long and a diameter 35 up to 50 µ. In the atmosphere they are transformed into invasive larvas and they infest swines, especially piglets 0-7 months old (Coates, S. 2000). The L3 will penetrate the alveoli, get coughed up and swallowed back in intestine 10 days post infection. Shortly after their journey to the small intestine is concluded, they molt to L4. There is another molt to L5 around 28 days post infection in the small intestine. As soon as 50 days after infection, inseminated females will lay thousands of eggs, completing the life cycle. Reduction in the productivity of swines is the main characteristic of ascaridiosis and the clinical signs are attributed to the number of parasites, which colonize the system having as characteristic verminous bronchopneumonia, which is especially expressed into piglets. 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. Pig farms have facilities provide suitable conditions for transmissionof A.suum (Masure D., at.al. 2013) and 10 to 12-week-old pigs have been shown to excrete high numbers of A. suum eggs, indicating that the pigs were exposed within a few weeks after being born (Roepstorff, A. 2003). The aim of the present study was therefore to expand the present knowledge on the epidemiology of A.suum with qualitative and quantitative description and alternatives methods of diagnosis.

Materials and Methods

At the pigs alive for quantitative and qualitative studies were used the stool examinations and examination of swabs taken from the nose leaks.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. The qualitative and quantitative sedimentation, the technique of swimming with the salt was the coproscopic method used in the study. To evaluate the parasitic load we applied the Mc Master technique. The samples were taken 50 gr for the individual samples and 150 gr for the collective ones. They were transported and preserved in containers and were generally examined within 24 hours. In cases when conservation was necessary they were kept in refrigerator at 4 degrees C (Stankiewicz, M. at al.1995). For examination by the leakage of nasal tampons in piglets were taken and examined within 12 hours atstereomicroscopes. For each tampon was counted the number of invasive larvae.

Post mortum examinations to the slaughterhouse were alternative methods of study for post mortem animals. Livers were checked for the presence of liver milk spots. All samples (adult parasites, larvae, organs) were preserved in 70 % ethanol. The content of the bronchopulmonaty system and small intestines of the animals were collected and were washed to collect any adult and remaining larvae. The content of the small intestine and the washing to collect ascarids (Roepstorff, A. 2003). Within 2 hours after necropsy of the pigs, the L4 and L5 were collected, were measured, counted and differenced by sex. 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. In piglets we examinated leaks nasal for the presence of invasive larvae. The washing was added to the corresponding content. The content plus washing was passed through a sieve and A. suum larvae were counted under a microscope.

These methods were applied, tested and compared in the alive piglets level and as alternative methods of coproscopic examination especially in piglets in slaughterhouse (Roepstorff, A. 2003). Alternative methods of diagnosis will extend to the entire territory of the country.In pigs from fecal samples were taken clinical observation and especially in the young piglets became careful for signs of pneumonia and when no nose leaks were examined for the presence of larvae.

Results and Disccusion

Coproscopic observations give the fast data for the presence and evaluation of parasitic load by *Ascaris suum* infection detailed according all swine categories. Summary includes average scores for all categories of pigs on all breeding systems in the whole territory of the country.

Table 1. Results of Coproscopic Examinations

Nr.	Age group	No of samples	Infestation level		Parasitic loads n/e/g/f	
			Number	%	Average	Variations
1.	Piglets 0-3 months	386	323	83.68	154	1 until 4600
2.	Piglets 3-7 months	461	364	78.96	168	1 until 2400
3.	Sows to be substituted	134	72	53.73	46	1 until 280
4.	Sows before farrowing	168	79	47.02	82	1 until 360
5.	Lactation Sows	192	94	48.96	112	1 until 780
6.	Boars	68	12	17.65	26	1 until 260
7.	Total	1409	944	67	86	1 until 4600

The results show clearly that *Ascaris suum* is really frequent among swines in our country. It resulted to be present all over the territory with considerable variations among swine categories, different geographical regions and the way of swine breeding. There are regional variations which are often attributed to the hygienic sanitary conditions in farms 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 %. While in the other intensive economies the lowest level of the region was in middle Albania with about 20%. In intensive economies, excluding the category of uncastrated pigs there is a considerable level of *Ascaris suum*. However, the most attached category are piglets 3-7 months old where parasitic load varies about 184 v/g/f. Intensity and parasitic loadof *Ascaris suum* infection showed that the impaired category are piglets. This brings out economic loss. Numerous reasons are among which the failure of prophylactic conditions at lactating sows, piglets, lack of hygienic conditions, the treatment regime etc. Almost all of the sows to be substituted represents one category with piglets (over 7 months old) gives evidence for an increasing tendency on prevalence and the parasitic loadcompared to other categories of sows. This increase goes untill to 10 %.

This highlights the lack of treatment and evaluation for this category of sows. In sows, before farrow the results showed a prevalence 47% and a parasitic load of about 112 v/g/f (minimum 1-maximum 780) and this is one of the main reasons of piglet infestation source in farms. Except for some intensive economies in the middle of the country, in general was observed a non-appropriate treatment and attention of sows in this condition. This approach confirmed the results for the prevalence (about 50%) parasitic load for lactation, sows resulted 112 v/g/f (minimum 1-maximum 780). We notice a high parasitic load for lactation sows and this is caused the decrease of their condition during lactation and the lack of veterinary and welfare conditions for this category.

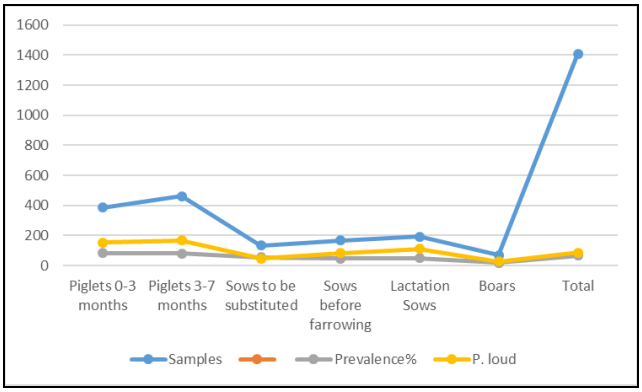

Figure 1. The values of coproscopic examinations.

The coproscopic examinations showed that *Ascaris suum* is really problematic for all economies of extensive and intensive growth of swineries. Prevalence in the economies of ½ intensive growth in middle (Tirana, Lac until Lezhe) and north-westAlbania (Shkodra) resulted high (respectively 84 and 84 %). The highest parasitic load and a prevalence 100 % in the economies of extensive growth, which is still in the level of households severely damages in swine productivity. In the north and north-east 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. In some cases the parasitic load is scary, there have often been found over 1200 v/g/f. In almost all the household economies no dehelminth is applied to sows before farrow.

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 opened, washed in saline, 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. For pigs aged untill 7 month, 186 samples (52 samples 3-3 muajsh and 134 samples 3-7 months) was examined. At the slaughter the lungs and broncioles were observed for signs of pneumonia and ascarids larvae were collected and examinated.

All samples were preserved in 70 % ethanol (Roepstorff, A. 2003). Intestinal worms were collected and measured for each pig. 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 (Wang T., at.al. 2013). 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.

Table 2. Results of alternative diagnosis.

Nr.	Age group	Samples no	Vermninose broncopneumonia no /%	Ascaridis in intestine no /%	Ascaridis in intestine (parasitic loads)	Lung spots no/ %	Larvae in nasal sputum no /%
1.	Piglets 0-3 months	52	18/34.6	22/42.3	1-40/14	42/80.76	14/26.92
2.	Piglets 3-7 months	134	42/31.3	68/50.74	1 until 22/8	8/7.53	17/12.68
3.	Sows to be substituted	24	2/8.33	9/37.5	1 until 14/6	0/0	0/0
4.	Sows before farrowing	8	0/0	3/37.5	1 until 16/8	0/0	0/0
5.	Boars	6	0/0	1/16.66	8 adults	0/0	0/0
6.	Total	224	62/27.67	103/45.98	1-40/7	50/22.32	31/13.84

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 were 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 were about 50% of the examined piglets. Interstitial pneumonia lesions correlated to the number of eggs ingested and time of infestation. Thus, there are numerousinvasion as the number of eggs ingested by animals, is great and finally occurred.

In such cases manifest respiratory symptoms (cough and dyspnoea) with petechiae or hemorrhage and accumulation of eosinophils roll larvae. 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 enters through the pulmonary artery into the lungs, reachs 4-7 days after infestation. 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 mucociliar, larvae emerge in the pharynx where together with saliva and fluids bronchial swallowed and down to the casing begins intestinal phases. 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. Piglets 3-7 months resulted in less lung spots (about 13%), while they arenot noted in other categories of pigs.

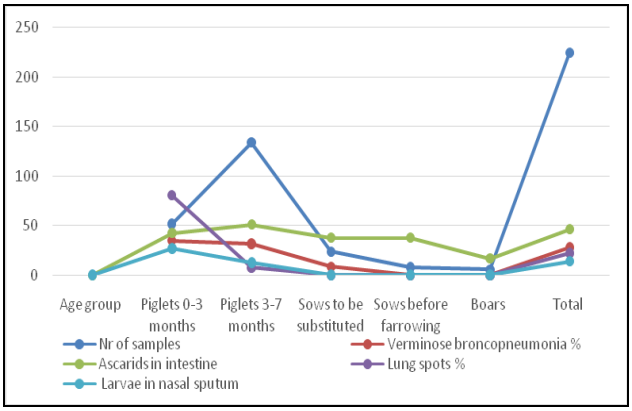

Figure 2. Results of Alternative Diagnosis

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. In piglets category up to 3 months, were examined samples of runny nose and resulted positive (about 30%) for the presence of larvae. Among those had tampons in their noses and were prepared to microscopic swabs.

Swabs were observed in microscopic preparations and stereomicroscopes, as wet and dry preparations. 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. 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.Diagnostic techniques proved to be very simple, extremely efficient and very fruitful for the outcome.

Conclusions

Ascaris suum infection is present in all pig farms (100%) and in all the categories and all breeding systemsover the territory of the Albania. The results from coproscopy showed that the prevalence is 67% and the most affected category are pigletss 0-3 months (83.68%). The average parasitic loud resulted 86 e/g/f (piglets 0-3 months 154e/g/f, piglets 0-7 months 168e/g/f, sows to be substituted 46e/g/f, sows before farrowing 82e/g/f, lactating sows 112e/g/f, and boars 26e/g/f.). Coproscopic examinations are efficient and offer the possibility of epidemiological estimatesand clearly evidenced that the parasite *Ascaris suum* is the more harmful parasite in the production of pigs in our country.Study evidenced that in addition with rutine coproscopic examination, we can use a range of diagnostic alternatives which are remain valid to the clear identification of *Ascaris suum* infection.

Alternative methods may be used as diagnostic in live animals and in animals in slaughterhouses. Post-mortem examinations in slaughterhouses are efficient, low cost and provide sufficient data for *Ascaris suum* infection. Efficient alternative diagnostic techniques as methods of *Ascaris suum* infection diagnosis will extend to the entire territory of the country and will be refined during the full accomplishment of the study.

These methods will be converted into routine techniques to perform quantitative diagnosis and other parasitic *Ascaris suum* infection estimates.

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