# Data about *Macracanthorhycus hirudinaceus* in Albania

**Veterinary Medicine**

**Keywords:** Macracanthorhyncus hirudinaceus, acanthocephala, swine, n/v/g/f, Albania.

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| **Bejo Bizhga** | | **Agricultural University of Tirana, Faculty of Veterinary Medicine, Department of Veterinary Public Health** |
| **Dritan Laçi** | | **Agricultural University of Tirana, Faculty of Veterinary Medicine, Department of Veterinary Public Health** |
| **Nezir Gjoni** | | **Agricultural University of Tirana, Faculty of Veterinary Medicine, Department of Veterinary Public Health** |

## Abstract

Macracanthorhynchus hirudinaceus is a species of acanthocephalan parasite found in the intestines of pigs and other hoofed animals, and can occasionally appear in humans and dogs. Adults attach to the intestinal wall of the host. It causes enteritis, gastritis or peritonitis in affected hosts. Eggs with acanthors (embryonated larvae) are found in the soil near domestic swine and can survive up to three and a half years, withstanding subzero temperatures. Acanthors are also found in the gut of the intermediate host. For the first time in Albania in swine at extensive growth we report the presence of Macracanthorhyncus hirudinaceus among all group ages of swine. The average parasitic load resulted 63 e/g/f in piglets 0-3 months old, 160 e/g/f in piglets 3-7 months old, 180 e/g/f in sows about to be substituted, 190 v/g/f in sows before farrow, 168 e/g/f during lactation and 90 e/g/f in uncastrated pigs. By evaluating the indices of the efficiency and the parasitic load for other parasites, we conclude that Macracanthorhyncus hirudinaceus is the main cause of hypo-efficiency in the area especially in swine of extensive growth.

## Introduction

Adult *Macracanthorhynchus hirudinaceus* (thorny-headed worm) is a parasite usually seen in the small intestine. They are 10 cm (males) to ~35 cm (females) long, 3-9 mm thick, and slightly pink with a transversely wrinkled outer covering. The anterior end bears a spiny, retractable proboscis or rostellum used for firm attachment to the intestinal wall. The eggs are dark brown, embryonated, with 3 embryonic envelopes, 90-110 × 50-65 µm. Eggs ingested by various beetles that serve as intermediate hosts. Infection begins when swine ingest infected coleopterans. Pigs infected by ingesting either grubs or adult beetles. The prepatent period is 2-3 months and the female lays ~260,000 eggs/day for several months. *Macracanthorhynchus hirudinaceus* has occasionally been reported in humans; transmission is by ingestion of infected insects, frequently dung beetles or cockroaches that have fed on faeces of infected pigs containing viable eggs and have then developed the cystacanth stage infective to the vertebrate host, including humans. In a lot of areas in most of the northern part of Albania (Lezha, Pukë and Mirditë), swine breeding is a tradition in households or small herds ½ intensive. In a lot of cases there is cohabitation of with people. The breeds represent hybridized swine where we often find the presence of boar blood. According to the data in this area of the country there are breeding of about 60% (150.000 head) of the total of swine of the republic. In certain areas there is a tendency to pass into intensive economies. Swinish products in this region of the country in most of the cases are used within the family of the stockbreeder, but only a small percentage of the total is shown. In general there is no regular veterinary control. This is mainly evident in households. Generally there is lack of antihelminth schemes and strategies for parasitic disease. The lack of hygienic sanitary conditions favour the biology of parasites. In the conditions of cohabitation with swine there is a higher possibility to transmit parasitic zoonosis. The North of Albania

presents variations of geography and climate, the altitude above the sea level has a lot of variations. There are areas, such as

**Fig. 2**. Map of Albania

Lezha, lowland under the sea level where the swine are cultivated like in the Albanian Alps at an altitude of about 1500-2000m (Pukë, Mirditë). The first data about the presence of *Macracanthorhynchus hirudinaceus* in swine in these territories were found in 1980. According to the information received from the Veterinary service it has often been suspected for *Macracanthorhynchus hirudinaceus* in swine. Parasites or parasitic granules have been found in the intestines, but their differentiation has not been performed. Diagnosing has been difficult because slaughtering and consumption of swine in these regions is done in family households often without veterinary control. Swine in these regions are nourished freely, thus they are often in contact with coprophagous coleopterans. According to the data from the collectors and biologists coprophagous coleopterans of the Scarabaeidae family, such as *Melolontha vulgaris*, *Cetonia aurata*, *Polyphilla fullo*, *Anomalia vitis* etc, are mostly widespread all over these regions. *Macracanthorhynchus hirudinaceus* infestation is encountered in swine of extensive breeding, as well as in wild boars. Swine of family households in these regions (Pukë, Mirditë) are often bred freely in nature and their blood is mixed with that of wild boars. Most of the swine bred in these regions are used for family consumption and mainly not under veterinary supervision. Swine are consumed by the breeding families usually while less than 7 months old. These and others are the causes of non differentiating and non identification of the epidemiological status of the parasites in these regions.

Fig. nr. 2. Map of study area

## Materials and Methods

The material was represented by faeces and inner organs, especially the digestive apparatus. The faeces were gathered and examined during the year 2010. They were taken individually to the rectum, especially for the high categories. The samples in the herds of the piglets were taken in paddocks, without being daubed with the parasites of the ground. The samples were transported to the Laboratory of Veterinary Parasitology at the Faculty of Veterinary Medicine, in Tirana. In most of the cases they were examined within 24 hours, but when necessary they were preserved in the temperature 4$^{o}$C. The coproscopic method that we used was that of qualitative and quantitative simple sedimentation. To control the small intestine of swine slaughtered in household conditions the whole intestine was taken after having removed the whole fat, ometum and mesenterium. It was tied at both extremes and later transported to the laboratory. In laboratory conditions the intestine was cut in length by means of scissors. It was rinsed out with tap water above an empty container. The intestine was cleaned gently and all the water used in rinsing the intestine was added to the content. The gathered filtrate was well homogenized and left for 2 hours. The content and the water were mixed and filtered, then, the part remain in the filter was put in a petri plate to be examined for the presence of parasites. After the complete rinse the intestine mucosa was observed carefully for the presence of parasites or parasitic granules. (Kassai, 1999; MAFF, 1986; Hendrix, 1998). The found

parasites were differentiated based on morphological characteristics of the cause in stereomicroscopic observation. Only some post mortem observations were done in slaughterhouses.

## Results

The swine were reported as infested in cases when at least one egg was clearly typified in the microscopic slide or in Petri's plaque. The prevalence for the categories of swine was calculated based on the number of infested swine in proportion with the number of samples from controlled swine and it was expressed in percentages. The data processing by using x2-test with SPSS Statistical Software version 10.01, to define the differences in the prevalence among swine groups which was evaluated statistically.
In total 203 faecal samples of both sexes, divided in 5 age categories in this area of Albania, were sampled and examined. The results are shown in the tables and graphics according to the categories and the kind of samples included in the study.

| Category | Nr. of samples | Positive | Prevalence | Parasitic load e/g/f |
|---|---|---|---|---|
| Piglets 0-3 months old | 42 | 11 | 26.19% | 63 |
| Piglets 3-7 months old | 52 | 36 | 69.23% | 160 |
| Sows before substitution | 53 | 32 | 60.38% | 180 |
| Sows before farrow | 18 | 13 | 72.22% | 140 |
| Sows during lactation | 26 | 15 | 57.69% | 168 |
| Un castrated pigs | 12 | 4 | 33.33% | 90 |
| **Total** | **203** | **111** | **54.68%** | **134** |

**Table 1.** The results of coproscopic examinations for *M. hirudinaceus* in swine at study area.

The average parasitic load resulted 63 e/g/f in piglets 0-3 months old, 160 e/g/f in piglets 3-7 months old, 180 e/g/f in sows about to be substituted, 140 v/g/f in sows before farrow, 168 e/g/f during lactation and 90 e/g/f in un castrated pigs. *Macracanthorhyncus hirudinaceus* was evident all over the area of the study. *Macracanthorhyncus hirudinaceus* was evident in all the swine categories excluding only un castrated pigs with a prevalence of 33.33% with an average number of eggs 90 e/g/f almost lower when compared to other categories. (excluding piglets 3-7 months old). The results obtained are directly affected by age groups. If that will not be affected by age category, then it shall be deemed prevalence 54.68%.
Applying the criteria Hi square the calculated value is 33.43 which is greater than the theoretical value for 95% certainty $\chi_2$ (5) = 11.07. The conclusion is clear. Positive prevalence is affected by age category. Even in real numbers in the table have different % of prevalence depending on the age. We think that this is influenced by the hygienic sanitary conditions of breeding which are miserable for the swine of this area; also by the extensive breeding conditions. The considerable lack of hygienic sanitary conditions, food daubing by coleopterans explains the high prevalence ( 54.68 %) and high parasitic load of 134 e/g/f (average). In the category of piglets 0-3 months old we noticed a prevalence 38.18 % and it resulted 63 e/g/f. The relatively lower values compared to other categories are explained with the biology of parasites. The intermediate hosts are the coprophagous coleopterans of the kinds *Scrabeus* spp., *Melolontha* spp., *Phyllophaga* spp., *Cetonia* spp., *Cotinus* spp., etc. They were present all over the area of the study. Even 0-3 month-old-piglets in the conditions of extensive growth in these regions simultaneously with their food receive infested coleopterans with acantels. The lower concentration of infestation in them is only explained with the characteristics of the biology of the parasite. The formation of an adult parasite requires

a period up to 3 months, but infestation with coleopterans for the present conditions of extension in pigs of this category is quotidian, which in the first month of their life are mainly milked by the mother. The embryonic eggs are taken by the intermediate host by preserving the infestation possibility for many years at the intermediate host. This means that taking into consideration the lack of hygienic conditions in food, piglets continuously take infested coprophegous coleopterans, but they also need a period of 2 until 3 months to react copropositive. This is the only reason why the other swine categories result more infested by *Macracanchohrncus hirudinaceus*. As far the disease does not result reported in Albania. In some studies carried out during the years 70-80 there are reports for the presence of a parasite in the small intestine of swine, however not identified. Despite the restrained sources for literature in Mediterranean countries this parasitic disease is found around 2.5–3.2 % of swine population (swine and boars). Clinical examinations were carried out on 40 swine collected from owners during the period from May 2008 to May 2010. The history of the examined specimens revealed *Macracanthorhynchus hirudinaceus* infestation and the presence of parasites in intestinal parasitic, parasitic granuloma and dysplasia.

| Category | Nr. of samples | Positive | Prevalence | Number of parasites |
|---|---|---|---|---|
| Piglets 0-3 months old | 8 | 0 | 0.00% | 0 |
| Piglets 3-7 months old | 9 | 3 | 33.33% | 2 |
| Sows before substitution | 8 | 2 | 25.00% | 3 |
| Sows before farrow | 7 | 2 | 28.57% | 2 |
| Sows during lactation | 8 | 3 | 37.50% | 2 |
| **Total** | **40** | **10** | **25.00%** | **2** |

**Table 2.** The results of macroscopic and microscopic examinations for *M. hirudinaceus* in the intestine.

The adult and eggs of *Macracanthorhyncus hirudinaceus* (Nansen and Roepstorff, 1999) were found in all the swine categories and in the digestive system, whose content was examined coproscopically in parasitic samples derived by the mucosa and parasitic granules. In all the cases when the digestive tube resulted copropositive for *Macracanthorhyncus hirudinaceus* under macroscopic observation we found presence of acanthocephala and parasitic granulomas in the intestinal mucosa. There resulted no acanthocephala in the small intestine and no trace of parasitic granulomas only in the category of 0-3 months piglets.

**Fig. 2**. Pigs at extensive growth system in Lezhe, Pukë and Mirditë, Albania.

We think that the reason is related to the biology of the parasite. The 3-months-period, although the food of this category is confirmed to contain parasite coleopterans, does not provide to the parasites the necessary time for their growth. Despite the limited number of samples by the digestive tube, which must be emphasised that was really difficult in these areas for the breeding conditions and getting in contacts with the veterinary service, all the other categories resulted positive.The reason why we report these values,

which are considerably high, are the extensive swine breeding conditions (family), lack of hygiene in food and high daubing with coprophagous coleopterans, infested by the lack of dehelminths scheme and as a result of a low veterinary control (almost none in some cases).


**Fig. nr.3**.Eggs from *Macracanthorhyncus hirudinaceus* at lab of parasitology, FVM Tirane Albania.

By evaluating the territory of the study directly, growth indices and breeding efficiency, especially in piglets of 2 categories 0-3 month old and 3-7 months old, and by evaluating the influence of other parasites we surely say that *Macracanthorhyncus hirudinaceus* is the main cause of hypo -efficiency noticed in the swine of the area. This hypo-efficiency was expressed in increased weight of the piglets. For this it would be enough to emphasise that piglets about 2-3 months old, weighed on average 15.7 kg and the category of piglets 3-7 months old weighed on average 34.3 kg.

**Conclusions**

*Macracanthorhyncus hirudinaceus* was evidenced to be a widespread helminth in swine at extensive growth in the district of Lezha, Puka and Mirdita in Albania. For the first time in our country this helminth, representative of Acanthocephala is reported in swine.

We examined eggs from M*acracanthorhyncus hirudinaceus* among all group ages of swine. The parasitic load of the levels 20-250 eggs per gram faeces evidences that this parasite (acanthocephala) is one of the causes that damages the efficiency of swine. The reason for its evidence in the economies of extensive growth is motivated with the biology of helminths, the conditions of treating and feeding swine in extensive conditions of their breeding. To prevent the extension and to minimize infestation there must be continuous parasitic controls even for the swine of this area, at least 3 dehelminths per year.

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