First abattoir report on bovine dicrocoeliosis from Algiers (Algeria)

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Abstract
The aim of the present study was to detect a possible presence of dicrocoeliosis in cattle slaughtered in the Mitidja’s area (north of Algeria). Livers of 1,400 cattle were examined during evisceration by dissecting the biliary duct and looking for the small liver fluke Dicrocoelium sp. Moreover, the bile of each cattle was harvested and analyzed in order to observe the presence of the parasite’s eggs. The results revealed Dicrocoelium sp. in cattle from two slaughterhouses in Algiers. The prevalence of dicrocoeliosis in cattle was found to be 0.07% and 0.86% corresponding to the flukes and eggs-positive cases, respectively. This is the first record of dicrocoeliosis in Algeria as no data from previous reports suggested likewise.

Keywords: bovine, Mitidja, prevalence, Dicrocoelium sp.

Introduction
Dicrocoeliosis is a hepatobiliary parasitosis caused by several species belonging to the genus Dicrocoelium (Trematoda, Dicrocoeliidae). Dicrocoelium dendriticum, the most causative agent of the disease, is reported throughout Europe, Asia, America and North Africa. Other species of Dicrocoelium are also reported worldwide, such as Dicrocoelium chinensis in Asia, Dicrocoelium hospes in Africa, Dicrocoelium orientalis in the old Soviet Union and Austria (Manga-Gonzalez and al. 2001).

The parasite mainly inhabits the bile ducts and gall bladder of domestic and wild ruminants (Otranto and Traversa, 2003). In livestock, it causes severe economic losses due to liver damage and reduction of milk and meat production (Manga-Gonzalez and al. 2001). Dicrocoeliosis is present in many countries worldwide where dry and calcareous or alkaline soils were favorable biotope for development of their intermediate hosts (snails and ants) (Otranto and Traversa, 2003). In Algeria, no information regarding dicrocoeliosis is available. We conducted this study for surveying an eventual presence of this disease in cattle slaughtered in the Mitidja’s area.

Material and methods
The animals studied
This study was carried out on cattle in different slaughterhouses of the Mitidja’s area from February 2016 to February 2017. A total of 1400 cattle including 865 males and 535 females were subjected to this screening. 351 cattle were studied in winter, 334 in spring, 236 in summer and 479 in autumn. The exact origin of the majority of cattle was not determined because they come from different livestock markets of the Mitidja’s regions.

Study area
The Mitidja’s area (36°36’N and 3°00’E) is a vast agricultural plain of 1400 km² with clay or calcareous soils. It’s specialized in cultivation and dairy cattle breeding. It is located in the north of Algeria and includes 4 wilayates: Algiers in the north (slaughterhouses of El-Harrach, Hussein-Dey, Eucalyptus and Rouiba); Blida in the south (slaughterhouses of Boufarik); Boumerdes in the east (slaughterhouses of Thenia) and Tipaza in the west (slaughterhouses of Kolea). This region is characterized by temperate Mediterranean climate, with mild and rainy winters but hot and dry summers.

Detection of Dicrocoelium sp.
Once cattle arrived to the slaughterhouse, we immediately established an information card containing sex of the animal and date of sampling. After the slaughter, each liver was inspected and the bile sample was collected. To inspect for the possible presence of Dicrocoelium species in the liver bile duct, two regulatory incisions were made: the first was long and shallow at the pallet level, and the second was short and deep at the base of Spiegel’s lobe. The parasite was identified by its morphological characteristics following the key for identification of Cringoli and Rinaldi (2014). Moreover, the bile of each cattle was collected by a syringe and sent to the laboratory in order to detect a possible presence of Dicrocoelium’s eggs. Adults of Dicrocoelium were observed with the light microscope (40 x magnifications) and different parameters were measured: the body, the oral sucker and the ventral sucker. On the other hand, the syrings containing the bile samples were placed perpendicularly on a rack during 15
minutes at average in order to allow eggs’ sedimentation. Then, two drops of bile samples were observed under the light microscope (40; 100; 400 x magnifications) to detect and measure the eggs.

**Statistical analysis**

Prevalence of dicrocoeliosis was obtained by dividing the number of cattle found infected by the total number of cattle slaughtered, including non-infected one. The association of bovine dicrocoeliosis with sex and season was analyzed by the Fisher’s exact test using DnaSP 5.

**Results**

Only one liver (0.07%) from the 1400 examined was found positive for *Dicrocoelium* sp. However, 12 (0.86%) from the 1400 examined bile samples contained eggs of *Dicrocoelium* sp. The liver fluke was small and measured 8mm in length and 1.4 mm in width. The body was semitransparent, with a black uterus visible to the naked eye. The parasite has two muscular suckers: the oral sucker (375µm in diameter) and the ventral sucker (460µm in diameter). The eggs of *Dicrocoelium* were small, oval, dark brown and thick-walled. They measured 40-43µm in length and 25-28µm in width, and contained miracidium with two germ balls. Dicrocoeliosis was found only in cattle slaughtered in El Harrach and Rouiba, and not in another visited slaughterhouses. Eggs of *Dicrocoelium* sp. were found in 1.27% and 16.66% of cattle slaughtered in El-Harrach and Rouiba, respectively, while the only *Dicrocoelium* adult found in this study was recorded in the slaughterhouse of El-Harrach.

Dicrocoeliosis was detected in 5 females (1.31%) and 7 males (0.58%). No significant difference was found according to sex ($p = 0.13$). On the other hand, dicrocoeliosis was significantly more prevalent in winter (2.28%) compared to other seasons: 2 (0.60%) in spring, 2 (0.42%) in autumn and 0 in summer ($p = 0.003$).

**Discussion and conclusions**

In Algeria, no study has reported this disease previously. However, dicrocoeliosis is known in other countries and has been reported worldwide.

Symptoms are rarely manifested in animals with dicrocoeliosis, even in heavy infection, therefore the disease is clinically undetected. However, it’s usually diagnosed during post-mortem examination of livers or by coprological assay for eggs detection (Otranto and Traversa 2003; Cringoli and Rinaldi, 2014).

In our study, we examined 1400 livers, and only one of them was positive for *Dicrocoelium* sp. (0.07%). It is a very low percentage compared to those reported in other countries during post-mortem examinations. Effectively, the different prevalences reported in a 5-year period between 1999 and 2004 in south Iran are: 1.47%; 1.21%; 0.83; 0.78; 0.69% (Ansari-Lari and Moazzeni, 2006). Otherwise, higher prevalences were reported in Portugal and north-western Spain (6%) (Arias and al., 2011) and Turkey (4.67%). However, much higher prevalences (47% and 66%) were found in slaughtered cattle in Switzerland and North Iran, respectively (Schweizer and al., 2003; Ahmadi and al., 2010).

The microscopic bile analysis showed that 0.86% of cattle were infected with eggs of *Dicrocoelium* sp. It is a very low percentage compared to those found in Nigeria, where 39% and 36.22% of cattle’s bile samples were found positive for eggs of *Dicrocoelium dendriticum* and *Dicrocoelium hospes*, respectively (Lyaji and al., 2018; Ieren and al., 2016).

In our study, 11 livers had no flukes in their bile ducts, but had eggs in their bile. This result is in accordance with the finding of Braun and al. (1995), which showed that out of 176 livers without flukes, 49 had *Dicrocoelium dendriticum* eggs in the bile.

The eggs contained in the bile will be eliminated with the stool in pasture, so other ruminants contract the disease, if conditions of the life cycle are favorable (favorable climate and presence of intermediate hosts: snails and ants). This is supported with high resistance of *Dicrocoelium*’s eggs in favorable biotope because they can over-winter and remain infectious for up to 20 months on pastures (Otranto and Traversa, 2003).

Our results did not show any association between dicrocoeliosis rate and sex of the animals. However, they showed significant seasonal differences. The disease is more prevalent in winter, which is in agreement with Manga-Gonzalez and Gonzalez-Lanza, 2005.

Dicrocoeliosis is observed in cattle slaughtered in Algiers. It would be interesting to carry out further studies on this parasitosis in small ruminants and animals with known origin; this will allow us to determine the area of contamination. Also, molecular techniques are needed for identifying the species of *Dicrocoelium*.

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**Conflict of interest:** None

**References**

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Sažetak:

Prvi izvještaj o dikroceliozi goveda utvrđenih u klaonicama u Alžiru

Cilj ove studije je istražiti moguće prisustvo dikrocelioze kod goveda iz klaonica u području Mitidje (Sjeverni Alžir). Nakon evisceracije i disekcije bilijarnog kanala su pregledani uzorci jetre na malog metilja kod 1400 jedinki. U isto vrijeme su uzeti i analizirani uzorci žuči kako bi se ispitalo prisustvo jaja parazita. Dobiveni rezultati su dokazali postojanje Dicrocoelium spp. kod goveda iz dvije klaonice u Alžiru. Prevalenca dikrocelioze bila je 0,07% za parazite i 0,86% za jaja. Ovo su prvi zabilježeni podaci o dikroceliozi u Alžiru.