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Research Article

Effect of Sex and Season on the Prevalence of Helminthic Parasites of *Bagrus bayad* in Sabke Dam, Katsina State, Nigeria

[*]Muhammad Musa Ahmad[1], Zulkifilu Sani[2], Abdulhamid Ahmed[2], Taufik Babatunde Ademoula[2], Bababngida Abdulkarim[3], Abubakar Sani[1], and Aisha Rabiu Wada[4]

[1]Department of Science Laboratory Technology, School of Science and Technology, Federal Polytechnic Daura, Nigeria
[2]Department of Biology, Faculty of Natural and Applied Sciences, Umaru Musa Yar'adua University Katsina, Nigeria
[3]Department of Fishery and Aquaculture, Faculty of Agriculture, Umaru Musa Yar'adua University Katsina, Nigeria
[4]Department of Biological Sciences, Faculty of life Sciences, Federal University Dutsinma, Katsina State, Nigeria
***Corresponding Author's email*: musa.muhammad@fedpolydaura.edu.ng**

ABSTRACT
Fish parasites and diseases remain some of the most important areas of research for fisheries biologists. Fish may serve as intermediate or definitive hosts of parasites that are of economic importance to man and other animals. This research aimed to investigate the seasonal variations in the prevalence of parasites in *Bagrus* (*Bagrus bayad*) in Sabke Dam. One hundred and twenty (120) fish samples were collected and rinsed for ectoparasites. Specimens were dissected and organs were bathed in saline solution for parasite recovery and identification. The result shows that in *Bagrus bayad,* the intestine had the highest occurrence of parasites of 24 (20.00%) followed by the stomach 22 (18.33%) respectively. Helminthic parasites recovered were Trematodes (*Neascus* sp), Cestodes (*B. aegyptiacus*, *P. clarias* and *P. glanduliger*), Nematodes (*Contracaecum sp* and *P. laevionchus*), and Acanthocephalan (*N. rutuli*). The result showed that the prevalence of infection increased with an increase in the host's size (length and weight), and infection was highest in the dry season. Therefore, follow-up surveys on the life cycle of the major parasites should be done at certain intervals in order to identify any change in the trends of possible fish parasites that could affect the fish populations.

Keywords: *Bagrus;* Fish; Helminthic; Parasite; Prevalence; Sabke Dam; Season

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INTRODUCTION

Fish has a very remarkable and important role to play on the lives of many individuals and communities all over the world, and it is also known as the primary and major source of relatively cheap and affordable essential animal protein. Fish is also considered to be within the various levels of food chain and influences the structures of dams, lakes, streams and estuaries as they are usually restricted to particular modes of life related to their food sources and reproductive requirements (Akinsanya and Otubanjo, 2006).

Due to higher nutritional value of fish (high protein retention, assimilation, low cholesterol content, and safety), it has continued to be important in the diet of humans in tropical Africa and different parts of the world (Akinsanya, 2015). However, due to the

increasing cost of beef in market calumniate for fish as the most feasible option in resolving protein shortage, as the fish oil contains omega-3-essential fatty acids necessary for the proper functioning of the brain, heart and immune system (Chandra, 2006). Additionally, Fishing and fish processing has provided many job opportunities for individuals and groups of people.

Fish parasites and diseases remain some of the most important problems confronting fishery biologist. Fish may serve as parentenic/intermediate or definitive hosts of parasites that are harmful to man and animals. Zoonotic diseases that result from the ingestion of raw or under cooked fish include opisthorchiasis, diphyllobothriasis, clonorchiasis, gnathosomiasis and anisakiasis. Fish accounts for about 40% of the required protein of two-thirds of the world population (Bichi and Yelwa, 2010).

Parasites are essential group of pathogens that causes infection and diseases of fish both in freshwater and marine environments (Chandra, 2006). Parasitic infection causes production loss and economic losses through direct mortality of the fish, reduction in fish growth, fecundity and increase in the susceptibility of fish to diseases. Therefore, parasitic infestations are become a greater threat to fish health management and aquatic crop production (Chandra, 2006).

Environmental condition of the water body and the occurrence rate of parasitic infections are closely related, and it also affects the general health of the fishes. Quality of the water include physical, chemical and biological characteristics in relation to all other hydrological properties (Abollo *et al.,* 2001). Physico-chemical and biological factors are used as to determine water quality, as they may directly or indirectly influence the condition of aquatic environment and invariably distribution and production of fish and other aquatic animals (Eyo *et al.,* 2014). Continuous anthropological activities are the major attributors of seasonal variation in the quantity and quality of water runoffs and tributaries that supply the dam which may alter the physical and chemical conditions of the water and may invariably affect the wellbeing of the fish. It has been reported that global warming and climate change could contribute to the alteration of the quantity and quality of the runoffs and tributaries. Health status of the aquatic ecosystem directly or indirectly influences fish health, thereby affecting immunity of fish and leading to disease susceptibility. Fishes in polluted water bodies are more susceptible to diseases (Ajala and Fawole, 2014). Water pollution can effectively limit the occurrence of some species of fish parasites and affect their qualitative and quantitative composition through influencing their eggs, free living larval stages and intermediate or final host (Chandra, 2006). It is possible that adverse environmental conditions may decrease the ability of organisms to maintain and effective immunological response system, so that an increased susceptibility to different diseases might be expected to occur (Esiest, 2011).

Fishes are affected by diseases which hinder their production through direct fish mortality, nutrient devaluation, alteration of biology and behaviour, lowering of immune capability, induction of blindness, growth and fecundity reduction and mechanical injuries which depend on the parasite species and load (Eyo *et al.,* 2014). There are many parasites belonging many including nematodes, trematodes, cestodes and acanthocephalans, affecting both wild and cultured fishes (Esiest, 2011). Parasites can cause swollen abdomen in fishes thereby contributing to either pseudo weight or length of fishes and can also lead to stunted growth thereby reducing the length and weight of the fish (Esiest, 2011).

To the best of our knowledge, little information is available in most of the fish diseases of natural waters in northern part of Nigeria. The present study will therefore give more emphasis to investigate the parasites of *Bagrus bagard* inhabiting Sabke dam in Katsina State, Nigeria.

MATERIALS AND METHODS

Study Area

Sabke Dam is a major dam and irrigation project located in Mai'adua Local Government Area of Katsina State, in northern Nigeria. It was built by the Federal Government to support water supply and agricultural irrigation in the region. The dam's construction began in the late 1990s**,** around 1996–1998, under the Petroleum Special Trust Fund (PTF) initiative. Sabke Dam lies between Latitude**:** ~12.06026° N and Longitude~8.15834° E. The dam is located about 35 km northwest of Daura, Katsina State.

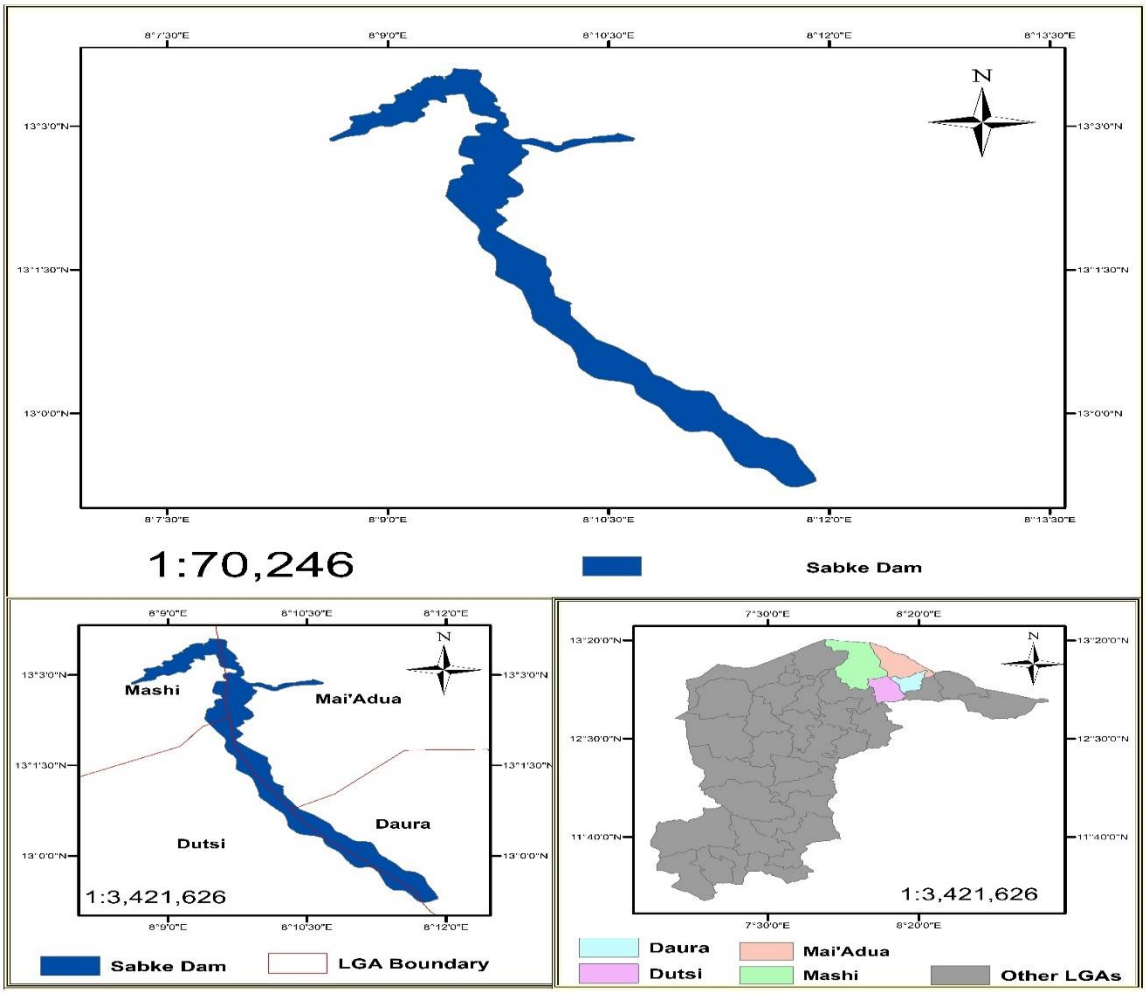

Figure 1: Map of Sabke Dam

Source: Cartographic unit, Umaru Musa Yar'adua University, Katsina

Collection of Samples

From January to October 2025, a total of 120 randomly selected fishes of *Bagurus bayard* of different weights and length groups were collected from three different sampling points with the assistant of local fishermen and examined. Samples were collected in the morning between 06:00 to 08:00am. Water from the dam was added to the samples before being transported in aerated plastic container to the Biological Science laboratory at Umaru Musa Yar'adua University Katsina.

Examination of fish for parasites

As examination progresses, dead fishes were removed and examined immediately while the live ones were kept in a plastic aquarium containing water from the dam, and examined subsequently. Lived fishes were killed by cervical dislocation to ease examination (Ajala and Fawole, 2014).

Ectoparasites

The entire external body surfaces of a freshly caught fish were thoroughly examined for ecto-parasites using hand lens. Mucous scrapings from dorsal part of the body of fish, lateral and tail ends were placed on clean glass slide, with a drop of saline added and were examined under 10x and 40x objective lenses of compound microscope. A small section of the affected body surfaces was cut and placed in aqueous formalin for 30 minutes. The mixture was shaken vigorously to dislodge relaxed helminths. The operculum of fish was cut open with scissors and gills were exposed. Gill arches and gill filaments were placed in different Petri dishes containing normal saline and were observed with hand lens, dissecting

and compound microscope for parasites (Bichi and Yelwa, 2010).

Endoparasites

Fish samples were placed dorso-ventrally on dissecting board and fixed to prevent movement. The body cavity was opened with the aid of scissors and the mesentery and connective tissues, connecting loops of the gut and the liver were cut and the organs separated. The gut was then stretched out, placed in a large Petri dish and cut into four regions (oesophagus, stomach, intestine and duodenum). Each section was then placed in a separate labelled dish. The separated gut sections were opened by longitudinal incision to expose the inner surface which was washed with very little quantity of distilled water into labelled test tubes. A drop of the residue was placed on the slide, and observed under 10x and 40x objectives of dissecting microscope for the various parasites. This was repeated until the entire residue was examined (Bichi and Yelwa 2010; Ajala and Fawole, 2014).

Most of the parasites were recognized by their wriggling movement on emergence from their host. Parasites were picked with Pasteur pipette and forceps. Parasites obtained were counted, labelled with the serial number of the fish and placed in physiological saline overnight to allow them stretch and relax; they were then fixed and stained using acetocarmine and lactophenol. Identification of the isolated parasites to species level was done by comparing observed parasites using keys provided by Gibson, (1996) and Barson and Avenant-Oldewage, (2006).

Data Analysis

Prevalence estimation, Relationship between fish length, weight and percentage infection. The relationships between factors such as length, weight, sex, species and season were obtained using Analysis of Variance (ANOVA). All statistical analysis were done using Microsoft excel 2010.

RESULTS

During the present study, seven species of different parasites: Trematodes (*Neascus* sp), Cestodes (*B. aegyptiacus*, *P. clarias* and *P. glanduliger*), Nematode (*Contracaecum sp* and *P. laevionchus*), Acanthocephalan (*N. rutuli*) have been isolated. Out of the seven parasites, four of them were found in the intestine and the stomach, while only one specie was found on the skin. However, the parasitic load was higher in the intestine and the stomach. The result shows that in *Bagrus bayad* the intestine had the highest occurrence of parasites of 24 (20.00%) followed by the stomach 22 (18.33%) respectively (Table 1).

With regards to the parasitic loads on sex, (Table 3), the prevalence of infection was found to be generally higher in males than female fish' sexes. However, from the number of fishes males are having the highest number of the female in all the three species examined. Out of 120 *Bagrus* examined male were 78 and 42 were females. The respective prevalence of infection was 53.85% and 42.86.

Equal number of fish samples were examined for all the fish species. For *Bagrus bayad, O. niloticus and C. gariepinus* examined for the dry season parasitic load was higher in March having infection rate of 11.67%, 8.33% and 8.33% respectively. However, the study shows that the parasitic Infection was high in dry season than the rainy season in all the fish species examined during the experiment. However, seasonal variation was observed between the two seasons ($p>0.05$) Table 4.

Bagrus bayad the infection was not found in length range of 14 – 17 and 18 – 2. However, the infection was higher in the length range of 26 – 29cm with 17.50% and lowest in length range 22 – 25cm representing 0.83% of the fish sample examined. The research revealed that the relationship between host size (length and weight) and percentage of infection presented in the Table 6. Fish between the total length groups of 26-29cm in *B. bayad* were observed to be more infected than the other length group.

With regards to the relationship between the fish weight and parasitic load, in *B. bayad* fish weight range of 301 – 340g is found to have the highest infection rate of 19.17% while 361 – 400g weight range is found to have the lowest parasitic infection with 2.5% infection.

Table 1: Parasites Distribution in organs of *Bagrus bayad*, in the study area

Parasites	Skin	Intestine	Stomach	Gills
Trematodes				
*Neascus*sp	14 (11.67)	-	-	-
Cestode				
B. aegyptiacus	-	8 (6.67)	2 (1.67)	
P.clarias	-		-	-
P. glanduliger	-	9 (7.5)	9 (7.50)	-
Nematode	-			
Contracaecumsp	-	2 (1.67)	1 (0.83)	-
P. laevionchus	-	5 (4.16)	10 (8.33)	-
Acanthocephalan	-	-	-	-
N. rutuli	-	-	-	-
Total	14 (11.67)	24 (20.00	22 (18.33)	

Table 2: Prevalence of infection by Sex of the fishes in the study area

Sex	No. examined	No. infected	Prev. (%)
Male	78	42	35.0
Female	42	18	15.0

Table 4: Seasonal occurrence of fish parasites in the study area

	No. examined	No. infected	Prev. (%)
Rainy			
May	12	5	4.17
June	18	8	6.67
July	16	5	4.17
August	14	2	1.67
Dry			
Dec	16	8	6.67
Jan	13	8	6.67
Feb	16	10	8.33
March	17	14	11.67

Table 5 Monthly condition factor of *Bugrus bayad* in Sabke Dam

Months	Condition Factor
Rainy	
May	1.81
June	1.32
July	2.01
August	1.11
Dry	
Dec	1.99
Jan	1.76
Feb	1.66
March	2.21

Table 5: Relationship between total length and percentage of infection in *B. bayad* in Sabke Dam

Length cm	No. examined	No. infected	Prev. (%)
14 – 17	-	-	-
18 – 21	-	-	-
22 – 25	8	1	0.83
26 – 29	33	21	17.50
30 – 33	32	16	13.33
34 – 37	29	14	11.67
38 – 41	18	8	6.67

Table 6: Relationship between weight and percentage of infection in *Bagrus bayad* in the Sabke Dam

Weight (g)	**No. examined**	**No. infected**	**Prev. (%)**
40 – 80	-	-	-
81 – 120	2	-	-
121 – 160	10	4	3.33
201 – 240	36	23	19.17
241 – 280	25	14	11.67
381 – 320	15	11	9.17
321 – 360	15	6	5
361 – 400	10	3	2.5
401 – 440	5	1	-
441 – 480	2	1	-

DISCUSSION

The overall prevalence of 50.00% observed in the present study was persistently very low particularly when compared to the 67.5 % reported by Kawe *et al.* (2016) and 56.4% reported by Amaechi (2014). It was however high when compared with the 18.70% reported by Biu and Nkechi (2013) and 18.5% by Ogbeibu *et al.* (2014). It is worthy to note that infection rates vary from one season to another and that a number of factors like endemicity, availability of intermediate host, susceptibility of a definitive host, amongst others, determine to a large extent the rate of infection (Biu and Akorede, 2013). The prevalence of parasites in *B. bayad* may be due to several factors which include feeding habit and diet of fish, habitat, immuno - competence of the fish, as well as the behavioral pattern of the fish (Eyo *et al.,* 2014). The occurrence of these parasites in the study area was not surprising as they have been reported previously from the same species or related species elsewhere (Akinsanya, 2015).

Majority of the parasites recovered were found in the intestine with very few in the stomach and skin. The high prevalence recorded in the intestine in this study cannot be unconnected with the findings of Dan-kishiya *et al.* (2013) who reported higher number of parasites in the intestine than the stomach and attributed it to several factors among which, was the presence of digested food or due to the greater surface area presented by the intestine. Similarly, Bichi and Yelwa (2010) also reported high prevalence of helminth parasites in the intestine than the stomach and argued that regional localization in the gut can be attributed to several factors, such as Hydrogen ion concentration, chemotactic response as well as food reserve.

Nematodes were recovered from both the stomach and intestine, whereas the cestode and acanthocephalan showed preference for the intestine. This could be due to the fact that nematodes have relatively developed alimentary canal and could easily move around any area of the host alimentary canal to feed on digested and semi-digested food (Abdel *et al.,* 2015).

In this study, infection was found to be independent of fish sexes. The highest prevalence of male than female fishes observed in this study may be as a result of difference in reproductive investment by male and female fish, immunosuppression by steroid hormone during spawning, competition for mate and cost of territorial defense (Eyo *et al.,* 2014). Contrary to the

mentioned, the higher prevalence of infection obtained among female fishes of *C. gariepinus* agrees with the findings of Tops *et al.* (2009), Imam and Dewu (2010) and Peeler *et al.* (2011), who reported higher parasitic infection in female fishes and attributed it to the physiological state of the females, as most gravid females could have had reduced resistance to infection by parasites. In addition, their increased rate of food intake to meet their food requirements for the development of their egg might have exposed them to more contact with the parasites, which subsequently increased their chance of being infected. Variations obtained in parasitic infection among the sexes of fish studied were not significant (P>0.05) implying that higher infection rates in either the male or female were simply by chance (Biu and Akorede, 2013).

The high prevalence of infection obtained in dry season in this study agrees with the report of Fawole and Akinsanya (2015), but disagrees with the findings of Bichi and Yelwa (2010). Seasonal variation in the occurrence of these parasites may be attributed to reduced water volume, resulting in much contact between the parasites and fish, thus leading to a relatively higher prevalence in the dry season (Akinsanya, 2015). In relation to size (weight and length) it was observed in this study that the percentage infection increased with increasing size. Similar observations were reported by Imam and Dewu (2010), that the longer and heavier the fish was, the greater the susceptibility to parasitic infection. This could be due to the fact that bigger fish cover wider areas in search of food than the smaller ones and as a result, they take in more food and this could expose them more to infestation by parasites.

CONCLUSION

The overall prevalence of parasites in this study was 50.00%. This infection rate for all the species of fish could be attributed to anthropogenic pollution of the dam. High prevalence of infection in this study may also be as a result of availability of parasites intermediate hosts (e.g. insects, molluscs and copepods) that inhabit the infective larval stages of parasites, and are eventually fed by the fish. In conclusion, the report would not have succeeded in identifying all the parasites that may likely be found on the studied fish.

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REFERENCES

Abdel Gaber, R., El Garhy, M. and Morsy, K. (2015). Prevalence and Intensity of Helminth Parasites of African Catfish *Clarias gariepinus* in Lake Manzala, Egypt. *Advances in Bioscience and Biotechnology*, **6**: 464-469.

Abollo, E., M. Calvo, and S. Pascual (2001). Hepatic coccidiosis of the blue whiting, *Micromesis tiuspoutassou* (Risso), and horse mackerel, *Trachurus trachurus* (L.) from Galician waters. *Journal of Fish Diseases*, **24:**335-343.

Ajala O.O, Fawole, O.O., (2014) Multiple Infections of Helminths in the Stomach and Intestine of Clariasgariepinus (Burchell, 1822) In Oba Reservoir, Oyo State, Nigeria. *IOSR-Journal of Pharmaceutical Biology Science* **9**: 05-12.

Akinsanya, B, Otubanjo, O.A. (2006). Helminth parasites of *Clarias gariepinus* (clariidae) in Lekki lagoon, Lagos, Nigeria. *Revista de Biologia Tropical* **54(1):** 93-99.

Akinsanya, B. (2015). A Two Fish Species Study of the Parasitic Helminth Fauna of *Synodontis filamentosus* (Boulenger, 1901) and Calamoichthyscalabaricus (Smith, 1865) from Lekki Lagoon, Lagos, Nigeria. *Ife Journal of Science* **17**: 97-108.

Barson, M. and Avenant-Oldewage, A. (2006). On cestode and digenean parasites of Clarias gariepinus (Burchell, 1822) from the Rietvlei Dam, South Africa. *Onderstepoort Journal of Veterinary Research*, **73**:101–110

Bichi, A.H. and Yelwa S.I. (2010) Incidence of Piscine parasites on the gills and gastrointestinal tract of *Clarias gariepinus* (Tuegels) at Bagauda fish farm, Kano. *Bayero Journal of Pure and Applied Sciences* **3**: 104-107.

Biu, A.A., Kofur, I. and Mohammed, A. (2013) Prevalence of Human Gastro-Intestinal Parasites in Biu, Borno State, Nigeria. *Journal of Biological Science and Bioconservation*, **5**, 8-12.

Chandra, K.J., (2006): Fish parasitology. K. R. Choudhury, 34/A/2, Ram Babu Road, Mymensingh-2,200, 196 pp.

Esiest, U.L.P. (2011) Length-weight relationship and parasites of Chrysichthysnigro digitatus in Cross River

Estuary Itu local government area Akwalbom State, Nigeria. *Basic Res J AgricSci Rev***2**: 154-165.

Eyo, J.E, Ejere, C.V, Aguzie, OI, Ivoke, N, Ekeh F.N, (2014). Parasitofauna of Five Freshwater Fishes in a Nigerian Freshwater Ecosystem. *Croatian Journal of Fisheries* **72**: 17-24.

Imam, T.S, Dewu, R.A. (2010). Survey of Piscine ecto and intestinal parasites of *Clarias* spp. sold at Galadima Road Fish Market, Kano Metropolis, NigeriaBiosci Res Commun **22**: 209-214.

Kawe, S.M, God'spower, R.O, Balarabe, M.R, and Akaniru, R.I. (2016). Prevalence of gastrointestinal helminth parasites of Clarias gariepinus in Abuja, Nigeria. *Sokoto Journal of Veterinary Sciences* **14**(2): 26-33.

Ogbeibu, A E., Michael, O. O, Ifeanyi, M. E, Joyce, O. E, and Joy, O. I. (2014). Using Pollution Load Index and Geoaccumulation Index for the Assessment of Heavy Metal Pollution and Sediment Quality of the Benin River, Nigeria. *Natural Environment*. **2(1)**:1-9.

Peeler, E. J and Taylor, N. G., (2011): The application of epidemiology in aquatic animal health - opportunities and challenges, *Veterinary Research*, **vol. 42**, no. 1, article no. 94.

Tops, S., H. L. Hartikainen, and Okamura B. (2009). The effects of infection by *Tetracapsuloides bryosalmonae* (Myxozoa) and temperature on *Fredericella sultana* (Bryozoa). *International Journal of Parasitology* **9**:1003-1010.