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# PREVALENCE OF FASCIOLOSIS IN CATTLE AND SHEEP SLAUGHTERED FOR HUMAN CONSUMPTION IN THE WHITE NILE STATE, SUDAN: A RETROSPECTIVE

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## المستخلص

بنيت هذة الدراسة على جمع بيانات من المسالخ فى ولاية النيل الابيض والتى شملت محليات الولاية الاربعه (كوستى, الجبلين, الدويم و القطينة) و ذلك لمعرفة نسبة انتشار اصابة الحيوانات بالدودة الكبدية للفترة من 1998-2007 . تراوح العدد السنوى للذبيح بين 37327-19659 راسا من الابقار و 65466-22215 راسا من الضان . سجل اعلى معدل اصابة بالدودة الكبدية (10.41%) فى العام 2000 واقل معدل ( 4.00 %) فى العام 1999 بالنسبة للابقار اما بالنسبة للضان فقد سجل اعلى معدل اصابة ( 3.37%) فى 2002 و اقل معدل ( 1.38%) فى 2007 . المعدل العام للاصابة فى الابقار( 6.05 %) اعلى من المعدل الذى سجل للضان ( 2.3 %). لم يسجل تغييرا معنويا خلال الموسم بالرغم من ارتفاع المعدل فى فصل الخريف فى عامى 2005 و 2007 . محليات الولاية المختلفة كان ترتيبها كالاتى من حيث معدل الاصابة فى الابقار: الدويم, الجبلين, كوستى ثم القطينة. الخراف اظهرت معدلات متشابهه فى كل المحليات و كذلك مع اختلاف الموسم.

## Abstract

This study was conducted to determine the prevalence rate of *Fasciola gigantica* infection in slaughtered cattle and sheep through collection of records during 1998-2007 in the White Nile State, Sudan. Four localities, Kosti, El Jebelein, Ed Dueim and El Geteina slaughterhouses were included in this study. Ranges of 19659 to 37327 heads of cattle and 22215 to 65466 heads of sheep were slaughtered annually during this period. The lowest prevalence rate (4.00%) for *F. gigantica* infection was reported in cattle in the year 1999 while the highest (10.41%) was recorded in 2000. The lowest prevalence rate (1.38%) in sheep was in 2007 and the highest (3.73%) was in 2002. The overall prevalence rate of *F. gigantica* infection was higher in cattle (6.05%) compared to sheep (2.37%). The prevalence rate was higher in the wet season compared to the dry and cold season, but the difference was insignificant ($p \geq 0.05$). Localities, the prevalence was found to be 9.2% in Ed Dueim, 9.1% in El Jebelein, 6.2% in Kosti and 2.9% in El Geteina for cattle. The prevalence rate in sheep, however, showed no significant difference ($p$ 0.05) withregard to season or locality.


## Introduction

The estimate of livestock population in Sudan was about 138.965 million heads in 2007 (ICAR, 2007). Sheep comprise about 36% of the population. More than 90% of domestic livestock are owned by nomads, 1.47 million heads of cattle are slaughtered annually for local consumption. Sudan

is considered as one of the main countries for exporting meat and leather. This comprises about 20% of the country foreign trade (Eisa, 2011). *Fasciola gigantica* infection causes great economic losses due to total or partial condemnation of livers. The disease is highly enzootic in many areas of the Sudan (Eisa, *et al*., 1979). Most of the previous studies on the prevalence of fasciolosis in the Sudan were based on slaughter houses records (Karib, 1962; Eisa, *et al*., 1979).

The objective of this study was to assess the prevalence rate of *F. gigantica* infection in slaughtered cattle and sheep and stress the need to implement a control program in the White Nile State, Sudan during the period 1998-2007.

## Materials and Methods

The White Nile State is located in the center of Sudan (Latitude: 13° 16' 27" N, Longitude: 32° 26' 59" E). It has an area of 30,411 square kilometers ($km^2$) and an estimated animal resource of approximately 7.875.673 heads. Kosti and Ed Dueim are located in the middle, while El Jebelein in the south and El Geteina in the north part of the state .This state was selected to study the prevalence of fasciolosis in cattle and sheep. Slaughter houses records were collected to assess the prevalence rate of *Fasciola gigantica* infection. This retrospective study covered the period between 1998 and 2007, only condemnations of livers due to *F. gigantica* infection were considered.

## Results

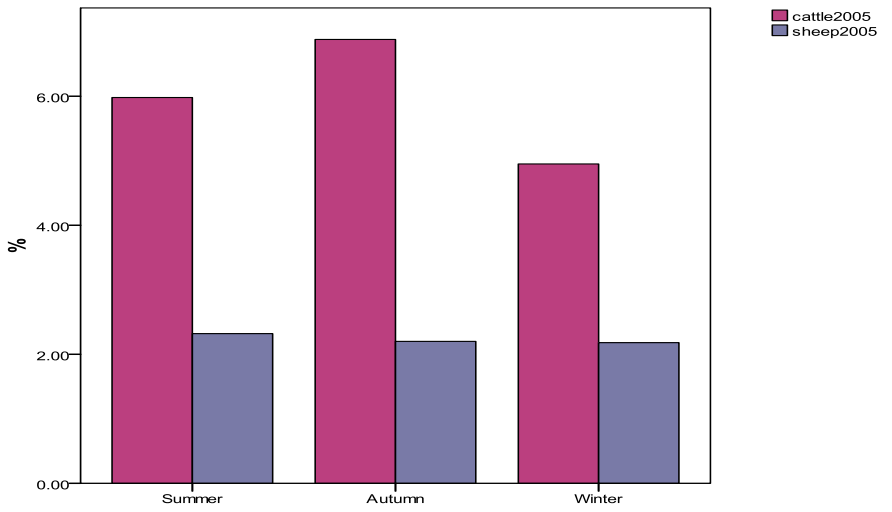
The study concentrated on records collected from slaughterhouses in the White Nile State during the period 1998 to 2007. The number of animals slaughtered ranged between 19659 to 37327 heads of cattle with a varying prevalence rate of *fasciola gigantica* infection. The lowest infection rate (4.00%) was reported in the year 1999 and the highest (10.41%) in 2000. The number of sheep slaughtered during the same period was 22215 up to 65466 heads with low prevalence rate of *fasciola gigantica* infection (1.38%) in 2007 and a higher rate (3.73%) in 2002. The overall prevalence rate for cattle (6.05%) was higher than the rate in sheep (2.37%) (Table 1). The reports for different seasons in the years 2005, 2006 and 2007 were shown in (Fig. 1) the highest prevalence rate was shown in the wet season for the year 2005 and 2007, but the same season reported the lowest rate in 2006 ($p \geq 0.05$) for cattle infection. Sheep infection was similar throughout the year. In 2007 the prevalence rate of sheep fasciolosis was lower in 2005 and 2006 with no significant difference ($p \geq 0.05$) in both. The prevalence in Kosti ranged between 7.4-4.7% (average 6.2%), in El Jebelein 4.39-16% (average 9.1%), in Ed Dueim 3.05- 16.4% (average 9.2%) and in El Geteina 0.8- 8.53% (average 2.9%) for cattle (Table 2). The prevalence in sheep was 1.9-3.5% (average 2.69%) in Kosti, 1.1- 4.1 % (average 2.74%) in El Jebelein, 0.7-4.1% (average 2.58%) in Ed Dueim and 0.6- 5.1% (average 2.04%) in El Geteina (Table 3).

**Table 1.** Prevalence rate of *F. gigantica* infection in Cattle and Sheep Slaughtered for human consumption in the White Nile State during 1998-2007.

| Year | No. Slaughtered | No. infected | No. Slaughtered | No. infected |
|---|---|---|---|---|
| | Cattle | | Sheep | |
| **1998** | 26408 | 1175 (4.44%) | *NA | *NA |
| **1999** | 24997 | 1001 (4.00%) | *NA | *NA |
| **2000** | 19659 | 2047 (10.41%) | 28757 | 1014 (3.53%) |
| **2001** | 21639 | 1928 (8.91%) | 30559 | 964 (3.15%) |
| **2002** | 23940 | 1979 (8.27%) | 22215 | 895 (3.73%) |
| **2003** | 25575 | 1728 (6.76%) | 33615 | 819 (2.43%) |
| **2004** | 29449 | 1504 (5.11%) | 35988 | 636 (1.76%) |

| | | | | |
|---|---|---|---|---|
| **2005** | 37327 | 2206 (5.91%) | 61546 | 1374 (2.23%) |
| **2006** | 41772 | 2063 (4.94%) | 65466 | 1482 (2.26%) |
| **2007** | 32375 | 1504 (4.65%) | 61382 | 849 (1.38%) |
| **Total** | 283141 | 17135 (6.05%) | 339528 | 8033 (2.37%) |

*** NA: Not Available**


cattle2005
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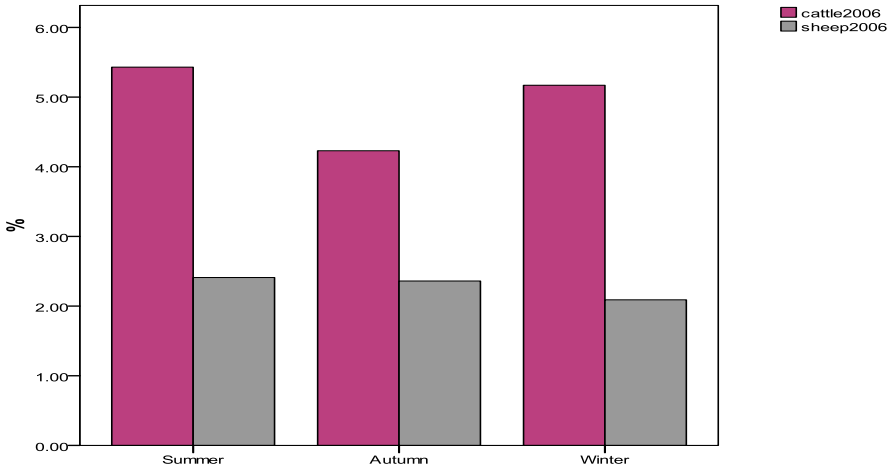
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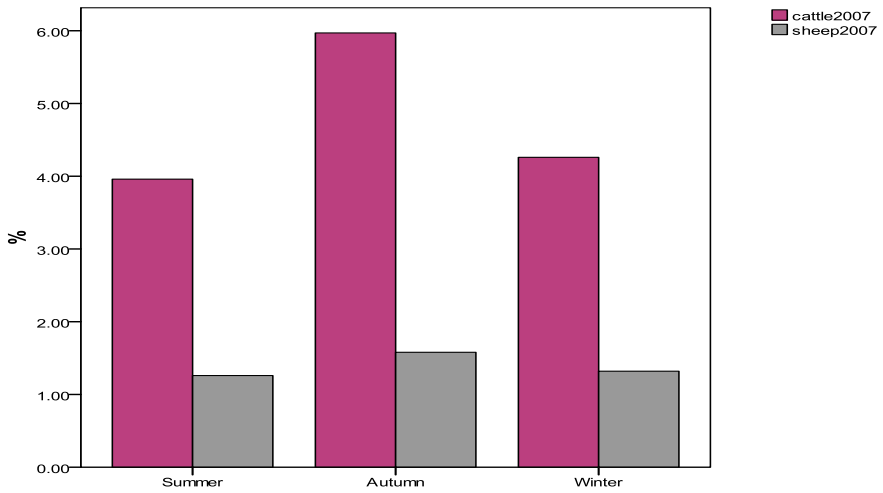


**Fig 1:** The prevalence rate of fasciolosis in slaughtered cattle and sheep in the White Nile State in different seasons of the years 2005,2006 and 2007.

**Table 2.** Prevalence rate of *F. gigantica* infection in Slaughtered cattle in the localities of the White Nile State during 2000 - 2007.

| Locality | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Average |
|---|---|---|---|---|---|---|---|---|---|
| **Kosti** | 10828 (7.4%) | 11519 (6.8%) | 12454 (6.3%) | 12994 (5.5%) | 13660 (4.7%) | 19413 (7.19%) | 16813 (6.85%) | 16701 (4.86%) | 14309.13(6.2%) |
| **El Jebelein** | 4498 (16.0%) | 5220 (13.5%) | 5986 (11.9%) | 6248 (9.0%) | 6974 (6.1%) | 8182 (4.39%) | 7954 (4.90%) | 6380 (6.99%) | 6430.25 (9.1%) |
| **Ed Dueim** | 3053 (16.4%) | 3449 (12.1%) | 3931 (11.7%) | 4463 (9.8%) | 7074 (6.0%) | 7511 (5.86%) | 4760 (8.53%) | 6100 (3.05%) | 5042.63 (9.2%) |
| **El Geteina** | 1280 (2.1%) | 1451 (1.6%) | 1569 (1.2%) | 1870 (0.9%) | 1741 (0.8%) | 374 (3.21%) | 2387 (4.86%) | 2685 (8.53%) | 1669.63 (2.9%) |

**Table 3.** Prevalence rate of *F. gigantica* infection in Slaughtered Sheep in four localities of the White Nile State during 1998 - 2005.

| Locality | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Kosti** | ***NA** | **NA** | 12149 (3.5%) | 12570 (3.2%) | 12962 (2.8%) | 13548 (2.4%) | 14918 (1.9%) | 34045 (2.5%) | 25960 (3.3%) | 25208 (1.9%) | 18920 (2.69%) |
| **El Jebelein** | **NA** | **NA** | 6236 (4.1%) | 6891 (3.5%) | 7139 (3.2%) | 7386 (3.0%) | 7808 (2.8%) | 10394 (2.1%) | 17176 (2.1%) | 21540 (1.1%) | 10571.25 (2.74%) |
| **Ed Dueim** | **NA** | **NA** | 8386 (3.5%) | 8805 (3.2%) | 9747 (2.8%) | 10438 (2.5%) | 10454 (1.2%) | 10326 (4.1%) | 7624 (2.6%) | 6662 (0.7%) | 9055.25 (2.58%) |
| **El Geteina** | **NA** | **NA** | 1986 (2.0%) | 2293 (1.4%) | 2367 (1.1%) | 2243 (1.0%) | 2808 (0.6%) | 1137 (3.3%) | 4718 (5.1%) | 6626 (1.8%) | 3022.25 (2.04%) |

**NA: Not Available**

## Discussion

The prevalence rate of *F. gigantica* infection in cattle and sheep slaughtered in the White Nile State varied according to years, animal species, localities and season. Throughout the study period from 1998 to 2007 the reported prevalence rate ranged from 4.44-10.41% and 1.76-3.73% for cattle and sheep, respectively and the overall prevalence was (6.05% and 2.37% for cattle and sheep, respectively).These rates were lower than that reported by Koko, *et al.,(* 2003) who found a rate of 12.5% out of 287 goats found positive for *F. gigantica* egg using faecal examination, and by Osman, (2011) who reported a prevalence rate of (41%) in cattle examined coprophlogicaly in Rabak. Malek, (1980) and Sule, *et al*., (2007) reported that the prevalence rate of *F. gigantica* infection is high in Zaria and is one of the causes of economic losses in the livestock industry in Nigeria. Mellau *et al*., (2010) found fasciolosis (8.6%) as the main cause of condemnation of cattle livers in Arusha abattoir. Hazzaz, *et al.,* (2010) reported a prevalence of 20.74% fasciolosis upon investigating the prevalence of parasitic diseases in Bangladesh. Our study showed that the prevalence rate was higher in cattle (6.05%) than sheep (2.37%). A similar result was reported by Mungube *et al*., (2006) who found that liver condemnation rates differed significantly between bovines, caprines and ovines ($p \leq 0.05$) for *F. gigantica* infection (26%, 6.6% and 5.2%, respectively). Abattoir studies in india revealed a higher prevalence in buffaloes (31.14%) than in sheep and goats (Rajat, *et al*.

2009). Also in Sulaimania (Iraq) slaughterhouse Kadir and Mohammed (2008a and b) found that the prevalence of fasciolosis was 9.22 and 0.13% for cattle and sheep, respectively. Boray, (2007) attributed that to the grazing habits of cattle which often graze in the wet marshy areas whereas sheep and goats graze away from this kind of pasture.

The four localities under investigation showed a higher prevalence rate in Ed Dueim (9.2%), El Jebelein (9.1%), Kosti (6.2%) and El Geteina (2.9%) in cattle, compared to, El Jebelein (2.74%), Kosti (2.69%), Ed Dueim (2.58%) and El Geteina (2.04%) in sheep. In Altaif abattoir, out of 2470 imported sheep, *F. gigantica* infection was reported at a rate of 17.55% in Turkish, 7.90% in Sudanese, 2.3% in Somali, 2.11% in Rumanian and 0.28% in Australian sheep. However, none of the imported camels from Sudan was infected (Ismail, *et al* 2011). The seasonal dynamics of the disease as reported in this study, showed that the higher prevalence was in the wet season with rate of 6.88% and 5.97% for the year 2005 and 2007, respectively than in the hot (3.96-5.43%) and cold (4.26-5.17%) dry season. However, Koko *et al.,* (2003) reported a high prevalence during the dry cold season (15%) compared to the hot dry season (9.9%), Osman, (2011) found no significance difference, while the highest prevalence in cattle was recorded during winter (cold dry season) (36.1%), and summer (hot dry season) (34%), while the lowest (31.8%) prevalence was recorded during autumn (wet season). Although the collected data revealed that the seasonal dynamics of the disease was not clear, it can be used as baseline for further

evaluation of the status in future multidisciplinary studies. It was not possible to get the exact records on breed or eco-types, sex and age for each animal slaughtered during the study period because of the poor reporting systems in the slaughterhouses. It is also difficult to precisely trace back the geographical origin of slaughtered animals due to the lack of reliable animal identification method.

In conclusion, a slaughterhouse recording of disease conditions is a complex way of gathering information on livestock diseases particularly sub-Clinical conditions. However, such surveys must be carefully planned, as slaughtered animals might have acquired infection from elsewhere in the country.

Proper supervision of slaughterhouses and implementation of high hygienic standards of food animals must be mandatory and slaughter policy and regulations of meat inspection must be strictly implemented at the slaughterhouses in the Sudan.

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## References

**Boray, J. C. (2007)** Liver fluke disease in sheep and cattle. *Primefacts* 446. http// www. dpi.nsw.gov.au/primefacts.

**Eisa, A. M.; El Badawi, E. S.; Saad, M. B. A.; Ibrahim, A. M. and El Gezuli, A. Y. (1979)** *The Sudan Journal of Veterinary Research*. **1**:55-63.

**Eisa, M. Z. M. (2011) Alrohal, 3:**51-53**.**

**Hazzaz, Md. Bin Kabir, Mohammad Eliyas, Md. Abul Hashem, Mohiuddin and Omar Faruk Miazi (2010)** *Univ. J. Zool. Rajshahi. Univ*. **28**:21-25.

**Information Center Animal Resources, ICAR (2007)**. Estimates of meat and milk production during 2002-2006 M.A.R.F.. Khartoum, Sudan. Pp:33

**Ismail M. Shalaby, Abdulelah A. Banaja and Manal B. Jamoom (2011)** *Global Veterinaria.* **6**(3):295-299.

**Kadir, M. A. and Mohammed, A. A. (2008a and b).** *13th Sci. Cong. Fac. Vet. Med., Assiut Univ. Egypt.*

**Karib, E. A. (1962)** *Bull. Off. Inter. des. Epiz*. 58: 337- 346.

**Koko, W. S.; Abdalla, H. S. and Galal, M. (2003)** *J. Anim. and Vet. Adv*. **2**(7):396-399.

**Malek, E. A. (1980)** Snail- Transmitted Parasitic Diseases. Vol. 2 CRC Press, Boca Raton, Florida.

**Mellau, L. S. B.; Nonga, H. E. and Karimuribo, E. D. (2010).** *Research Journal of Veterinary Sciences, **3**: 179-188.*

**Mungube, E.; Bauni, S.; Tenhagen, B. A.; Wamae, L.; Nginyi, J. and Mugambi, J. (2006)**. *Trop. Anim. Hlth. Prod*. **38** (6):475-483.

**Osman, O. M. (2011)** Studies on the Epidemiology, Immunodiagnosis and Chemotherapy of *F. gigantica* in the White Nile State in the Sudan. PhD thesis, Sudan Academy of Science. Khartoum, Sudan.

**Rajat, G.; Yadav, C. L.; Kumar, R. R.; Banerjee, P. S.; Vatsya, S. and Godara, R. (2009).** *Trop. Anim. Hlth. Prod.* **41**

**Sule, B.U.; Ulayi, B. M. and Adamu, S. (2007)** *J. Anim. Vet. Adv*., **6** (9): 1112-1115.