

Prevalence and distribution of *Dicrocoelium dendriticum* and *Fasciola hepatica* infections in cattle in Switzerland*

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Whereas *Fasciola hepatica* infections are frequently observed in cattle and sheep in many parts of Europe (Hauser 1977; Van Tiggele 1978; Mitchell 1979; Pfister 1987), *Dicrocoelium dendriticum* appears to be more limited to certain areas and has been described in sheep rather than in cattle (Boch and Supperer 1983). Consequently, the pathology and the epidemiological pattern of *D. dendriticum* infections are much better documented for sheep (Wolff 1976; Wolff et al. 1984). However, considerable numbers of *D. dendriticum* infections are also detectable in cattle in our area; the figures may vary according to local conditions, e.g. grazing system and management. Previous abattoir surveys have revealed a prevalence of *D. dendriticum* in slaughtered adult cattle in Switzerland ranging between 30% and 55% (Ruosch 1966; Eckert et al. 1975). According to a representative study performed in 1972/1973, Eckert et al. (1975) have estimated the prevalence of *F. hepatica* in cattle in Switzerland as being about 11.5%; however, the differences between various areas and farms were considerable (Schneider et al. 1975; Hauser 1977).

With a view to the steadily increasing demands for food hygiene and the introduction of improved measures of prevention, an update of the prevalence, distribution and epidemiology of these two liver fluke infections in cattle is highly desirable. Furthermore, this preliminary study aims to show whether the recent introduction of new fasciolicides has led to a reduction in the prevalence of *F. hepatica* infections.

A total of 2,033 livers from cattle (1,236 females and 797 males, all older than 12 months) originating from most parts of Switzerland and slaughtered in various abattoirs were examined. There was no particular selection; all animals that had been slaughtered on 1 day were included. Prior to the liver inspection, the gall bladders were removed entirely and stored in 1.5-l beakers at 4° C. The livers were examined macroscopically ac-

ording to the Federal Instructions for Meat Inspection, and liver fluke infections were registered and classified into *F. hepatica*, *D. dendriticum* and mixed infections of the two parasites. In the laboratory, the bile was rinsed into the beaker and the gall bladder was washed using tap water. The bile was allowed to sediment for 30 min, and the final sediment (15 ml) was analysed microscopically for the presence of liver fluke eggs. For estimation of the number of *D. dendriticum* in adult cattle, the livers of 12 naturally infected cattle (≥ 2 grazing seasons) were examined according to the guidelines of the World Association for the Advancement of Veterinary Parasitology (Powers et al. 1982). The results obtained on the prevalence of *D. dendriticum*, *F. hepatica* and mixed infections are presented in Table 1 and in Fig. 1.

The examination revealed that 67.7% of all female cattle and 11.4% of all male cattle were infected with liver flukes, the majority by *D. dendriticum* (62.5% for females; 9.8% for males). It is striking that >80% of all female cattle older than 60 months had liver flukes. Mixed infections were found in 11.2% of the females and 0.6% of the males, whereas 5.2% (females) and 1.6% (males) of all animals harboured *F. hepatica* mono-infections. The prevalence of *D. dendriticum* in female cattle younger than 18 months amounted to 24.2%; thereafter it constantly increased with age to >70% in female animals older than 6 years. The quantitative analysis of 12 livers from adult dairy cattle naturally infected with *D. dendriticum* revealed worm burdens varying between 31 and 1,434 specimens (mean burden 728 lancet flukes) after ≥ 2 grazing seasons; an association with age could not be established. The preliminary pattern of distribution shows that *D. dendriticum* occurs throughout the country, but according to the presently available results, animals in the northern part of Switzerland seem to be infected more frequently.

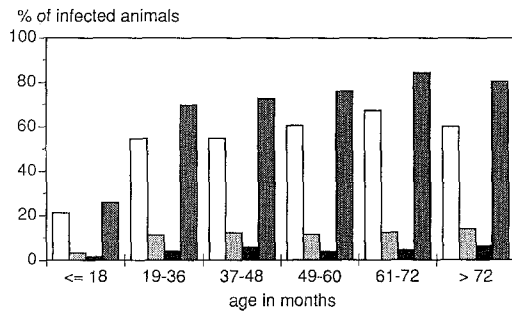
These preliminary results, representative for many parts of Switzerland, reveal that a high proportion amounting to >45% (928 of 2,033 slaughtered animals) of the cattle in Switzerland are harbouring liver flukes,

* Dedicated to Prof. Dr. J. Eckert (Zürich) on the occasion of his 60th birthday

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Table 1. Prevalence of *Dicrocoelium dendriticum* and *Fasciola hepatica* infections in male and female cattle in Switzerland

Sex	<i>D. dendriticum</i>		<i>D. dendriticum</i> and <i>F. hepatica</i>		<i>F. hepatica</i>		Total infected		Total examined
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)
Male	73	9.2	5	0.6	13	1.6	91	11.4	797
Female	634	51.3	139	11.2	64	5.2	837	67.7	1236

**Fig. 1.** Prevalence of *Dicrocoelium dendriticum* and *Fasciola hepatica* in different age groups of slaughtered female cattle. Symbols: □ *D. dendriticum*; ■ *F. hepatica*; ▨ *F. hepatica* and *D. dendriticum*; ■ total liver flukes

the majority bearing *D. dendriticum* or a mixed infection together with *F. hepatica*. This figure is surprisingly high, particularly because 39% of all animals examined were male beef cattle (age ≤ 26 months) that were kept and fattened indoor and thus had a much lower risk of infection.

With an overall incidence of 62.5% in females and 9.8% in males, *D. dendriticum* is widely prevalent and its detection constitutes a serious problem for meat inspectors (Ducommun and Pfister 1990). The prevalence of dicrocoeliosis in all cattle examined in Switzerland is similar to that previously observed (Ruosch 1966; Eckert et al. 1975), but remarkable changes in the fattening regime of male beef cattle in recent years rule out a direct comparison of these results with those obtained in prior investigations. Apart from a lack of efficacious drugs and a rather low pathogenicity, the most likely reasons for such a high infection rate would be the extremely favorable geological conditions for the reproduction and survival of the two intermediate hosts in our calcareous regions (Neumann 1988; Schuster and Neumann 1988).

Much higher than expected was the prevalence of *F. hepatica*, which occurred in 16.4% of female cattle (5.2% monoinfections, 11.2% mixed infections) and 2.2% of male cattle. These figures – considered to be representative – appear slightly higher than those found in the early 1970s by Eckert et al. (1975), who observed a countrywide mean infection rate of 11.5%. They are significantly higher than the 4.2% rate previously established by Ruosch (1966) or the incidence of 2% found by Bürgisser (1948) in slaughtered cattle. Certainly, there are considerable variations between different areas. Nevertheless, the present values enable the conclusion to be

drawn that despite the recent introduction of new fasciolicides, fasciolosis occurs very frequently in our area. However, these figures also indicate that particularly *F. hepatica* – but also *D. dendriticum* – infections often remain clinically undetected or undiagnosed, most likely because of their subclinical appearance. The lack of reliable direct or indirect diagnostic methods also contributes to the high prevalence of fasciolosis (Pfister 1990).

For obvious reasons, a significantly higher percentage of the extent of both parasites in female cattle is related to the differing uses of the animals. In contrast to steers and oxen, dairy heifers and cows frequently graze for several seasons and can thus very easily acquire these infections at a later stage of life. It remains to be established whether immune reactions play a role in these infections. Most impressive were the 2.2% (*F. hepatica*) and 9.8% (*D. dendriticum*) rates of carriers among male beef cattle, which further proves the easy transmission of these infections by additional indoor grass or hay feeding in fattening units. A continuous increase in the prevalence of both flukes – much more obvious for *D. dendriticum* – with increasing age occurred in heifers and dairy cows; actually, the prevalence of *D. dendriticum* rose until the 6th year of age to levels of $>70\%$, but it seemed to stabilise thereafter at $>60\%$.

The present quantitative analysis revealed a mean *D. dendriticum* worm burden of 728 specimens in adult cattle, which is considerably lower than those usually observed in sheep (Wolff et al. 1984; Bruat 1985). We hope that further research efforts will provide more information about the pathology of *D. dendriticum* in the liver of cattle. The present results do not yet enable an overall estimation of the geographical distribution of this parasite; however, it appears that *D. dendriticum* – although detectable in all parts of the country – is more concentrated in the northern part of Switzerland.

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