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ZOONOTIC INTESTINAL INFECTIONS

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Zoonoses are infectious diseases capable of natural transmission from animals to man. In most cases patients are infected by foods, but infection may also occur e.g. by contact with animal manure or via water. The occurrence of *Salmonella*, *Campylobacter* and *Yersinia enterocolitica* infections is reported below. Verotoxin-producing *E. coli* infections will be dealt with in a future issue of EPI-NEWS.

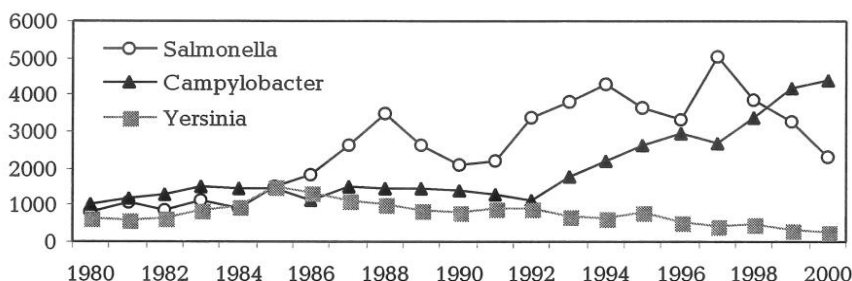
Campylobacter

After a fairly stable incidence over the previous 10 years, the annual number of reported *Campylobacter* infections has risen from 1,139 in 1992 to 4,402 in 2000 (83 per 10⁵, Fig. 1). *Campylobacter* may give rise to severe infections of the intestine, often with bloody diarrhoea, and maybe associated autoimmune reactions such as arthritis or Guillain-Barré syndrome, EPI-NEWS 32/99. *Campylobacter* spp. are found in several animal species and is common in domestic poultry and other birds. Swine and cattle also act as a reservoir, and the bacteria can survive freely in the environment. Sources of human infection include underdone poultry or inadequately grilled meat and contaminated milk products and water.

Campylobacter infections show a characteristic seasonal variation, cases peaking at the end of July or beginning of August. This variation is approximately paralleled by its occurrence in chickens for consumption, although in some years human cases may peak somewhat earlier. In recent years the consumption of poultry has risen in Denmark, and at the same time there has been a trend towards greater consumption of fresh and pieced poultry in comparison with frozen products. This change has probably played a part in the increased frequency of human infections, but other factors such as increased travelling and grill cooking may also have contributed. At present there is no certainty about the relative importance of these factors, or whether they represent the real cause of the rise.

The rising incidence is worrying, as the reported cases presumably only represent a limited proportion of the total number of infections. The

Fig. 1. No. of reported cases of zoonotic *Salmonella*, *Campylobacter* and *Yersinia* infections, 1980 - 2000



health problem is thus potentially greater than the figures might at first sight imply.

Salmonella

Whereas the incidence of *Campylobacter* infections has been rising since 1992, trends in *Salmonella* infections have been up and down, Fig. 1. The first peak occurred at the end of the 1980's and was chiefly due to *S. Typhimurium* in chickens for consumption. The second peak occurred in 1994 and was due to *Salmonella* infections from pork. At the same time during the 1990's there was an increase in *S. Enteritidis* infections from eggs, this trend culminating in 1997 when 5015 cases of *Salmonella* infection were reported. 73% of these were due to *S. Enteritidis* and in these cases eggs were the most frequent source of infection. There is thus not just one, but three *Salmonella* problems in Denmark, due to different types of bacterium from different sources. In 2000, 2,324 cases of *Salmonella* infection were reported (44 per 10⁵), corresponding to a 29% fall from 1999 and less than half the number of cases reported in

1997. Enteritidis and Typhimurium are still the predominant serotypes, Table 1.

S. Typhimurium types that are often multiresistant, such as DT104, made up 25% of typhimurium cases in 1999, while they fell to 10% in 2000, 44 of these cases being due to DT 104.

A cause of the marked fall in the number of *Salmonella* cases may be sought in the drive to reduce the prevalence of *Salmonella* in poultry, pork and egg production. The Danish integral "stable-to-table" drive against *Salmonella* is intended to brake the spread of the bacteria by a combined effort at all links in the "stable-to-table" chain, but a special emphasis is placed on primary production. Factors such as changing consumer habits and the population's greater awareness of risk products are probably also contributing to the fall in the number of *Salmonella* infections.

Yersinia enterocolitica

In contrast to the well publicized food-borne *Salmonella* and *Campylobacter* infections, the fall in *Yersinia enterocolitica* infections, from 1,512 in 1985 to 265 in 2000 (5 per 10⁵), has not attracted much attention. Swine form the most important reservoir for *Yersinia*. *Y. enterocolitica* infections produce similar symptoms to those due to *Salmonella* and *Campylobacter*, so that this fall is one of the pieces of evidence that the overall rise in intestinal infections due to bacterial pathogens is not just the result of improved diagnosis and surveillance. If this were so, a uniform rise in infections due to all pathogens would be expected.

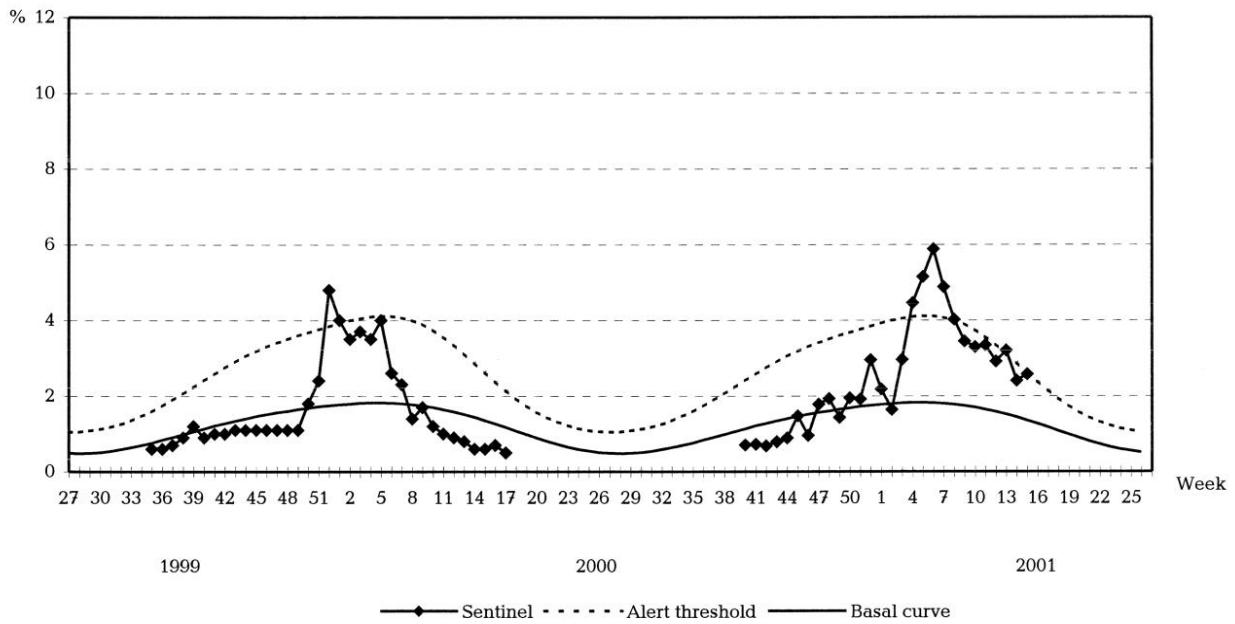
(K. Mølbak, Dept. of G-I Infections)

Table 1. Most frequent *Salmonella* serotypes, 2000

Serotype	No.	(%)
Enteritidis	1,200	(52)
Typhimurium	434	(19)
Agona	73	(3)
Hadar	62	(3)
Virchow	41	(2)
Thompson	37	(2)
Senftenberg	34	(2)
Newport	26	(1)
Infantis	24	(1)
Stanley	22	(1)
Others	371	(16)
Total	1,124	

Sentinel surveillance of influenza activity

Weekly percentage of consultations, 1999/2000/2001



- Sentinel:** Influenza consultations as % of total consultations
- Basal curve:** Expected frequency of influenza consultations under non-epidemic conditions
- Alert threshold:** Possible incipient epidemic

(Dept. of Epidemiology)