MASS MORTALITY OF COMMON EIDERS *SOMATERIA MOLLISSIMA* IN THE WADDEN SEA, WINTER 1999/2000: FOOD RELATED PARASITE OUTBREAK?

MASSALE STERFTE VAN EIDEREENDEN IN DE WADDENZEE, WINTER 1999/2000: VOEDSELGERELATEERDE UITBRAAK VAN PARASIETEN?

Between November 1999 and May 2000, large numbers of dead and dying Eiders *Somateria mollissima* washed ashore in the Dutch and German Wadden Seas. Eiders roosting near the coast were reported to be in a very poor condition and most were unable to fly. Between December and May, well over 20 000 Eiders died in the Dutch Wadden Sea (NZG/NSO database) and just over 2000 were reported from German waters (B. Reineking *pers. comm.*). A long-term time series of beached bird surveys showed that the mortality was between 4 and 7x background levels (excluding mortality due to oil): the most serious non-oil related mortality outbreak in Common Eiders in these waters since the mid-1960s (Swennen 1972; Camphuysen 1997, 2000). Juvenile Eiders predominated early in the incident, more and more adults were found later in the epizootic.

All beached Eiders were in an exceptionally poor condition (subcutaneous and deposited fat stores depleted, very poor condition breast muscle; C.J. Camphuysen & T. Kuiken unpubl. data) and the birds had lost at least 25-35% of normal body mass. The most probable cause of the emaciation is a lack of adequate food (starvation). The most significant pathologic finding besides the severe emaciation was multifocal enteritis caused by a parasite infection. Virtually all dissected Eiders were heavily infected with endoparasites, mainly the thorny-headed worm *Profilicollis botulus* (Acanthocephala) in the intestines, but including potentially pathogenic parasites such as the Nematod *Amidostomum acutum* in the gizzard (H. Cremers *unpubl. data*). Many acanthocephalids had penetrated the intestinal wall of the Eiders and protruded into the abdomen. The parasite infection is regarded as being the proximate cause of death. The parasite burden may be indicative of a shift of the Eiders towards secondary prey (Green Shore Crabs are the intermediate host of *P. botulus*), in immune status or some other factors.

Eiders need to select prey with a favourable flesh content/shell thickness ratio. Importantly, the lower quality threshold value of cockles for the Eider is unknown. The (third) mild winter (in a row) may have suppressed cockle condition. Besides, the Dutch Wadden Sea is currently under stress by widespread mechanical Common Cockle *Cerastoderma edule* fisheries and Blue Mussel *Mytilus edulis* cultures. The mass-mortality of Eiders, molluscivorous seaducks with cockles and mussels as their main prey could be interpreted as a signal of a malfunctioning ecosystem, whether or not negatively influenced by the fisheries.

There was no histologic evidence for a virus related background of the mortality (T. Kuiken unpubl. data). From a Dutch (RIKZ) water quality monitoring programme, using mussels as bioindicators, Hg, Cd, PCB, PAH, and HCB levels can be classified as 'normal', i.e. not indicating a probable cause of this mortality event (M. Eggens unpubl. data). Continued disturbance at remaining food patches (Eiders are purposefully disturbed at mussel cultures), the search failure to find alternative prey,

intraspecific competition for a scarce prey and starvation itself can lead to chronic stress (high levels of corticosterone) which in turn inevitably leads to immunosuppression. On the basis of these mechanisms, one would predict dominant classes of birds to succumb last (adults, the juveniles dying first) and a large variety of diseases to be identified in dead and dying birds as a result of the general reduction in disease resistance.

There are major gaps in present knowledge, such as factors related to the quality of prey, prey distribution and prey availability. The information about the food base of the Eiders was spotty and more directed to the needs of the fishing industry than to the monitoring of food availability for Eiders. Some vital information, such as the lower quality threshold value for cockles, is not known. Year-to-year monitoring of the health status of the Eider population in the Wadden Sea is absent, and yet it is vital to have such surveillance to be able to deal with mortality events such as this one. The data collected during this epizootic will now be analysed and be prepared for publication in due course. The many aspects of the epizootic will probably lead to some highly specialised publications that may appear scattered over a wide variety of (specialised) journals. Meanwhile, particularly because there are so many uncertainties in this and similar incidents, we are keen to hear other peoples opinions and experiences about this and similar events.

SAMENVATTING

Tussen november 1999 en mei 2000 jaar zijn er in de Nederlandse Waddenzee tenminste 20.000 Eidereenden omgekomen en daarnaast nog eens ruim 2000 in de Duitse Waddenzee. De massale sterfte van deze schelpenetende eendensoort wordt gezien als een signaal van een malfunctionerend ecosysteem. Nadere inspectie van de Eidereenden wees uit dat de vogels tenminste 25-35% van hun normale lichaamsgewicht hadden verloren, dat het vooral juveniele (eenjarige) exemplaren betrof, en dat de darm in de meeste gevallen stampvol zat met een venijnige parasiet, de Acanthocephaal Profilicollis botulus. *De parasietinfectie was opvallend, maar vermoedelijk slechts een bijverschijnsel (proximate doodsoorzaak). Er zijn geen aanknopingspunten om te veronderstellen dat er vergiftiging of een virusuitbraak in het spel was. De vermagering van de eenden en wijst op verhongering door voedselgebrek (misschien door een geringe kwaliteit van de aanwezige kokkels). De intraspecifieke competitie van Eiders op de schaarse voedselvoorraden, in combinatie met de voortdurende verstoring van eenden op een aantal mosselpercelen, kan leiden tot chronische stress en een hoge spiegel van het stresshormonen. Een aanhoudend hoge spiegel leidt tot aantasting van het immuunsysteem, waardoor de vogels vatbaar worden voor ziektes en parasieten.*

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