

*Expanded abstract*

## Female fecundity, neonatal mortality and the impact of contagious ecthyma on a captive herd of muskoxen

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Four male and four female muskoxen, *Ovibos moschatus*, acquired during the years 1977–1982 were the founders of the herd at the Minnesota Zoological Garden. With the exception of an orphaned bull calf from Northwest Territories, all were captive born at the Calgary Zoo (2♂; 0♀); Winnipeg Zoo (1♂; 2♀); and Okanagan Game Farm (1♂; 1♀).

Of 44 pregnancies documented in the herd between 1980 and 1990, 39 were live births (38 single calves and one set of twins). Five pregnancies resulted in premature or still births (four single calves and one set of twins). The average age at first birth is 35.9 months. Therefore, females are considered reproductively mature at two years. The fertility rate (the number of pregnancies per number of cows of reproductive age) is 95.5% (100% in nine of eleven years). Jingfors (1982), suggests the most reliable indicator of productivity in a herd is the number of calves per cow of reproductive age. Factoring all live births, the MZG calf/cow productivity is 0.87. This does not factor neonatal mortality, however. The sex ratio of the 46 calves and fetuses examined was 22 males; 23 females with one unidentified sex.

Neonatal mortality (the number of calf deaths during their first year versus the number of live births) for the 11 yr. period was 25% (10 of 40 calves). Yearly neonatal mortality rates are shown in Table 1. Four of ten calves died within ten days of birth (3 due to infections, 1 due to hyperthermia). Of the 6 other calf deaths, 2 were related to infection, 2 were associated with complications from contagious ecthyma, 1 suffered inanition secondary to a heavy parasite burden, and 1 calf, abandoned at birth, was euthanized when nine months old due to failure to thrive.

Neonatal exams are performed 24 hrs after birth. Calves are separated from dams and physically restrained, then sexed and eartagged for identification. The umbilicus is examined and dipped in tincture of iodine. A physical exam is performed, blood is drawn for a complete blood count and immunoglobulin status. Vitamins A, D<sub>3</sub>, E and selenium are administered. The calves are then returned to the herd.

Contagious ecthyma has presented medical and management problems within the herd. All outbreaks of CE have occurred between mid-August and mid-September in each of four

Table 1. Neonatal mortality rates.

Year	Reproductive females (number)	Live births (number)	Still-births (number)	Fertility rate (percent)	Neonatal deaths (number)	Neonatal mortality (percent)
1980	1	1	0	100	0	0
1981	3	2	0	66	0	0
1982	3	2	1	100	1	50
1983	4	4	0	100	3	75
1984	4	5	0	100	1	20
1985	4	4	0	100	1	25
1986	4	4	0	100	2	50
1987	5	4	0	80	0	0
1988	5	5	0	100	0	0
1989	6	3	3	100	1	33
1990	7	6	2*	100	1	16
Total		40	6	95.5% Average	10	25% Average

\* Twins

years (1978, 1980, 1983 and 1985). Mild outbreaks occurred in 1978 and 1980, with the worst occurring in 1983 when 8 of 12 animals showed lesions. Unique to the MZG infection has been the severity of eyelid lesions. Lesion proliferation and exudation mechanically blinded three animals for two or more weeks (Wright, 1983). Unlike infestations in Alaska and Norway (Kummeneje and Krogsrud, 1978; Mathiesen *et al.*, 1985; Dieterich *et al.*, 1981), lip and oral lesions did not interfere with eating or drinking. Secondary infections and complications resulted in the death of two calves in 1983, but not adults have died as a result of CE infection. The secondary infections and the proliferation of the lesions are thought to be the result of a heavy infestation of biting insects, primarily flies and gnats attracted by the erupting lesions. During the 1985 outbreak, lesions were visible only on those calves and yearlings that were born following the 1983 outbreak, suggesting an immune response in the rest of the herd. There has been no recurrence since the 1985 outbreak.

Inoculations, with autogenous vaccines during winter months, is one way to minimize the impact of CE outbreaks. Such a program is likely to be developed if this disease reappears within the herd.

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