Age susceptibility of red deer (*Cervus elaphus*) to paratuberculosis

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Aim

- To measure the relative susceptibility of three age classes of red deer to paratuberculosis, using experimental challenge with MAP.

Materials and methods

- Three groups of seronegative female deer:

  30 three-month-old weaners
  20 fifteen-month-old yearlings
  20 adults.

- Received four oral doses of ~10^9 cfu of a bovine strain of MAP derived from jejunal lymph nodes of a clinical case of paratuberculosis in a young red deer.

- Paddock-monitored daily, weighed at 1-4 week intervals, blood sampled regularly and faecal sampled twice over the 50 week study.

- Clinically affected animals promptly euthanased and necropsied.

- Remaining deer were killed at the end of the study and necropsied. Gross findings were recorded and samples of intestine and associated lymph nodes taken for culture and histopathology.

Results

- 10 weaners (37%) developed clinical paratuberculosis and were euthanased 20-28 weeks post challenge (pc), but no clinical cases occurred in the yearlings or adults (P<0.05).

- All 10 clinically affected weaners had severe gross and histopathological lesions of Johne's disease.

- Three weaners died of misadventure.

- At slaughter, gross lesions were seen in jejunal lymph nodes of 8/17 weaners, 2/19 yearlings and 0/20 hinds (P<0.05).

- Histopathological lesion severity scores of deer slaughtered 50 weeks pc averaged 4.9, 3.5 and 1.1 for the weaner, yearling and adult groups, respectively (P<0.05).

- MAP was recovered from faeces of all 10 clinical cases at euthanasia, 13/19 weaners, 6/19 yearlings and 1/20 adult hinds 24 weeks pc (P<0.05) and 3/17 weaners, 4/19 yearlings and 1/20 adult hinds at slaughter (NS).

- MAP was cultured from samples of the intestine and/or lymph nodes from all 10 clinical cases and from 16/17 weaners, 19/19 yearlings and 18/20 adult hinds at slaughter.

	n	Clinical cases	Ave Gross Lesion Score (from 0-5)	Ave histo-pathological Lesion Severity Score (from 0-13)	No. with Lesion Severity Score of: 0-3 (nil or non-specific lesions)	4-7 (mild para-tuberculosis lesions)	8-13 (mod. to severe paratuberculosis lesions)	No. with MAP positive jejunal lymph nodes at euthanasia or slaughter
Weaners	27	10 (37%)	3.2	8.1	6 (22%)	9 (33%)	12 (44%)	26 (96%)
Yearlings	19	0	0.5	3.5	9 (47%)	10 (53%)	0	18 (95%)
Adults	20	0	0	1.1	18 (90%)	2 (10%)	0	18 (90%)

Conclusion

- There is increasingly strong age-related resistance in red deer against clinical paratuberculosis and subclinical disease, but not to infection.

- The high incidence of clinical paratuberculosis in young weaners in this infection model mimics the high incidence in young deer on some heavily infected deer farms in New Zealand and suggests high early exposure to MAP.

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