Review of calving losses in an intensively managed red deer herd

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Abstract

An analysis of calving losses and reproductive wastage in an intensively managed deer herd has been made at Invermay over the past 2 seasons, covering approximately 1000 births. This herd has experienced calving management and a routine birth recording system.

A simple post mortem study of dead neonates recorded the most likely cause of death. Additional factors that may have been related, including paddock features, hind age, time of calving, pedigree background, weather and environment, stock density and hind history were also recorded. The possibilities of any simple obvious relationships were investigated.

Calving losses of 3.2%, relative to other relevant industry standards, suggested that intensive management per se *was not contributory to the loss which was less than commonly recorded industry averages of between 4-8% and greater.*

Desertion, mismothering and born dead remain the major biggest loss factors, with the event occurring at birth, or within 72 hours. Few if any other common contributory factors were identified from this herd.

Reproductive wastage in yearlings reflects failure to conceive as much as calf death. A 4-8% calf loss appears typical of similar farms. Losses were spread throughout the season, with no sire effect, a minor hind age effect, a minimal paddock factor effect, and a minor relation to un-seasonal weather exists. In general terms overcrowding, hind to hind disturbance and disruption to the hind calf bond in early life are considered to be the major contributory causes of calf wastage. Improvements may be made by lowering stocking density and enhancing the calving environment.

Introduction

In recent times as deer farming has intensified, the level of calving wastage has become an issue of growing concern to many deer farmers and a significant financial loss to the industry (Asher & Pearse, 2002). While conception rates via ultrasound scanning may vary greatly between individual farms, common performance data suggests on average 95% of mature hinds mated under normal mating management do conceive (Judson, 2001). This high conception rate is not however, expressed in weaning rates. The reality for the average farm is an 84 – 86% weaning rate in adult hinds and ~70% in first calving hinds (weaning rate is universally defined as the number of calves tagged or weaned in the first week of March, relative to the total number of hinds mated) (Wilson & Audige 1998, Asher & Pearse, 2002). Significant recent industry benchmarking projects (Deer South, Deer Master and the Richmond Wrightson Deer Performance Project) report a range from 75-100% suggesting there are a number of variables at play (Campbell et al., 2001).

From these benchmark profiles a typical herd of hinds consists of approximately 20-25% yearlings and 75%-80% mixed age hinds. The contrast in potential calf loss between the ages is marked, with weaning rates further compromised in yearling hinds due to failure to conceive (Judson, 2001; Asher & Pearse, 2002). The strong implication is in all deer farming situations, ~5-12% (an average 8-10%) of calves born in intensive deer farm conditions fail to survive the period from conception to weaning. In average herd sizes (MAF monitor farm ~ 400 head) such losses can easily total 30-40 calves. If these have a conservative weaning weight of 48kg at a of value $4.50/kg ($236/head), calving wastage can equate to more than $6,000 annual direct loss (without counting loss in feeding these hinds and the impact on the management system).

In industry terms as we approach 2 million hinds on farm, even if we can reduce current losses by 50%, a potential 90,000 extra calves could be weaned annually with a value of $21.3 million, recorded as weaner sale value. Market demand (for example high weaner prices) can extend that loss by a further 30%. The unearned potential for venison extends that loss by another $20 million, directly from farmers pockets each year. If simple management or calving environments could be changed to reduce this loss the industry stands to gain significantly in terms of revenue, welfare and better on-farm practice. The opportunity arose to fully investigate all causes of calf death, in an environment of intensive highly stocked breeding hinds in the AgResearch, Invermay herd where all dead calves and associated information could be collected with some confidence.

A detailed collection and post mortem study of all calf deaths from red deer hinds calving within the Invermay herd in the 2000-2001 and 2001-2002 seasons was conducted in an attempt to extend earlier broad survey work on the reasons for calf wastage conducted (Gill, 1985,1988; Pearse & Pollard 1999 unpublished). Those studies concluded that mismothering, dystocia and stillborn causes were the main cause of calf loss. Disease did not appear to be a large contributing factor.

The Invermay herd has always been closely monitored during calving. Birth tags are applied, calves weighed and dam/calf pairs established at 24- 36 hours following birth. These proceedures are part of a well-established routine conducted by experienced staff. We do not believe that this in itself contributes to calving wastage in the Invermay herd.

The survey combined data from all lost calves and is a review of every factor involved that the authors considered relevant.

Method

All Invermay hinds are closely monitored during the breeding season for pedigree and science requirements. Following the 12-hour bonding period (ideally between 24- 36 hours of age) calves are tagged and recorded with hind ID, paddock location and birth date. Such interaction follows a strict routine, developed over 20 years experience, so that while this is not usual practice on most commercial farms, there is no direct evidence that this contributes to the level of loss incurred by the Invermay herd (as shown in Table 4). Significantly this level of loss is not higher than other recorded industry benchmarks. This fact provides some conviction in assuming the research herd is affected by similar circumstances as other deer herds in intensive farm situations.

Dead calves and mortality survey information was collected (where possible) in daily paddock searches. This involved recording calf ID, birth date, death date, dam, dam age, sire, sire breed, sex, weight, farm paddock location, weather conditions and any unusual activities or events.

Under veterinary guidance a post-mortem investigation was conducted in the facilities at Labnet, Invermay, in conjunction with histological services, to determine probable causes of death. Gross pathology in most cases was sufficient to make a diagnosis. Primary reasons for death were recorded using a standard list of causative factors shown in Table 1. These factors were expanded in a post-mortem investigation by considering the additional indicators outlined in Appendix 1 as developed by Mulley (1989) in his survey of fallow deer death. This table is reproduced here in full with our adaptations to the subclasses.

Results data are presented on a year-by-year basis. We consider adults and first calving hinds as separate groups for the purposes of comparison – as is the case with the contrast in industry data between first calving hinds and adults.

Other Deer Farming factors

There is also an increasing industry trend for developing large herds of breeding hinds (>1000) in high country improved and native pastures where space is optimal and hinds are free to behave in natural surroundings. Results suggest that consistent weaning rates of 93-98% across both age groups are common and maintained year to year (Wallis, pers com).

While this trend may continue to expand it is also worthy of note that a number of intensive operations, some of considerable scale, consistently report weaning rates in excess of 94% for adults and 90% for yearlings. These farms are often based on non-intervention or nil disturbance during the calving season, although their managers have a realistic idea of what is happening through frequent and routine observation. Work is underway to determine common features for success in the areas of cover, space, quality nutrition and calving spread.

Generally calving groups have some common age basis particularly with the first and second calving hinds and groups may be separated based on sire and scan data and predicted calving date. While concentrated calving patterns within confined groups appears contra-indicated, (Pollard 2002, these proceedings) the balance between management for enhanced lactation by using early condensed calving spread groups and a herd rotation from an early age and the prospect of an improved survival of calves with a dispersed pattern is a fine line.

It may be simply that on intensive farms a temperament trait of tolerance of intervention and disturbance by other hinds or outside events may be the next step in the domestication of farmed deer as demands of recording, herd improvement and utilising the full potential for calf growth develop.

It is of further interesting to note that in benchmarking and survey reports of the impact of calving losses due to cross- breeding or hybridization programmes, no trends or commonly reported cases of larger calves creating birth difficulties in base red hinds are noted. Dystocia and assisted births or cases of hind death during calving are equally found within and cross strain breeding. Whether this is a true reflection is unclear. Our experiences over a number of years with imported elk sires (420-460kg peak weight) and older, large hinds (>115kg) consistently report high conception rates (94-98%) and weaning rates of 89-92%. Calf loss does occur and there is some need for assistance in some cases although we report a successful outcome to most assisted births with an early intervention. The common factor again appears to be selection of hinds tolerant to our well-established routine and close monitoring.

Table 1: Broad diagnostic codes used for classifying deaths of red deer calves (after Mulley 1989).

Primary cause		Detailed definition
1. Stillborn	(a)	intrauterine – disease
	(b)	prolonged birth, dead at birth
2. Misadventure	(a)	drowned
	(b)	trapped – rocks, under-runner
	(c)	stuck in fence/gate etc.
	(d)	calf movement – migration from paddock
3. Mismothered	(a)	deserted – found in calving spot
	(b)	rejected calf (moved from calving spot)
	(c)	beaten calf
	(d)	not feeding
4. Dystocia	(a)	yarded and assisted – born dead
	(b)	found paddock – born dead
	(c)	assisted, died within 72 hours
5. Infection	(a)	Cryptosporidiosis
	(b)	systemic infection
	(c)	other
6. Accident/management	(a)	broken limbs/deformity – destroyed
	(b)	management, yarding, run over etc.
	(c)	injury (twisted bowel etc)
7. Hind related	(a)	hind disease (mastitis etc)
	(b)	calving problems (bearing out etc)
8. Other/undefined		
9. Weather	(a)	cold/exposure
	(b)	dehydration/heat

Results

Table 2: Mating, calving and loss statistics from Invermay red deer hinds

2000-2001

Hind group	Number of hinds	Scanned pregnant	Calves carried full term	Calf deaths
Mixed aged	466	445	442	27
Yearlings	85	74	74	2
Total	551	519	516	29

2001-2002

Hind group	Number of hinds	Scanned pregnant	Calves carried full term	Calf deaths
Mixed aged	426	394	390	11
Yearlings	78	72	72	4
Total	504	466	462	15

Table 3: Time sequence patterns of reproductive wastage to weaning in Invermay red deer hinds

2000-2001

Hind group	Conception loss (%)	Embryonic loss (%)	Calving loss (%)	Total wastage (%)
Mixed aged	4.5	0.9	6.1	10.9
Yearlings	12.9	0	2.7	15.3
Total	5.8	0.5	5.8	11.6

2001 – 2002

Hind group	Conception loss (%)	Embryonic loss (%)	Calving loss (%)	Total wastage (%)
Mixed aged	7.5	1.0	2.8	10.7
Yearlings	7.6	0	5.5	12.8
Total	7.5	0.8	3.2	11.3

Table 4: Primary causes of calf wastage

Rank	Cause of Calf deaths	2000-2001	2001-2002	Total	%
1	Dystocia	7	5	12	27
2	Mismothered	8	3	11	25
3	Stillborn	3	3	6	14
4	Misadventure	5	1	6	14
5	Infection	1	0	1	7
6	Accident	1	2	3	7
7	Weather	3	0	3	2
8	Other/undefined	1	1	2	5
9	Hind related	0	0	0	0
	Total deaths:	29	15	44	100

From the analysis of causative factors it is clear that the areas of loss reported verify earlier work that attributes four major causes: dystocia, mismothering, stillborn and misadventure. These factors can be associated with the assumption that disturbance of some sort is the major influence as suggested by Gill (1988). It appears overcrowding even at 6 hinds per hectare, with hind to hind interaction and small paddocks, are contributing in this case. It was important to look at all other contributing causes.

The following analyses are of the potential influence of hind age, sire, and dam influence, time of birth, farm paddock location and birth weight on calf survival.

Parental effect

(i) *Sire*: Although some sires produced multiple calf losses (max = 6), no common effects of sire could be determined, possibly due to the small sample size.

(ii*)* *Dam*: No dam lost successive calves losses in the 2 years of this study. That is there was no 'repeat offending' by dams. This may well be due to the annual practice of culling poorly performing hinds from the herd.

Age of dam

Data are presented in Table 5.

Table 5: Calf deaths in relation to dam age

Dam age (years)	2000-2001	2001-2002	Total	% of herd
13	1	0	1	0.9
12	0	0	0	5.2
11	4	2	6	5.4
10	5	0	5	4.1
9	0	0	0	4.6
8	1	0	1	7.6
7	0	3	3	8.8
6	2	1	3	8.0
5	5	0	5	13.8
4	4	4	8	12.2
3	5	0	5	15.2
2	2	4	6	14.1
unknown		1	1	

A chi-square test showed (χ^2 = 20.66, df =11, p= 0.037) a broad association with age, with lower losses from older hinds. Reasons could include a less restrictive culling policy in earlier days, or that these hinds are often involved in cross-breeding, ET and AI programmes.

Time line of events

The weekly frequency of calvings and losses are presented in Figure 1.

Location

Herds of calving hinds were located in 40 different paddocks in year one. Calf deaths (n=29) occurred in 22 of these paddocks. The following year 15 deaths were recorded in 13 different paddocks. There was little overlap, and few common features, except for wallow holes which are often new features, small swamps and under-runners which were recognised as hazards. Overall, there was no clear paddock effect. However, there were common trends within paddocks. Measures to ensure paddock safety and security, such as filling in under runners and fawnproofing fences are suggested.

Birth weight of calf

Data from both calving seasons suggest no significant relationship between calf size and likelihood of death. In no cases was excessive calf size related to death. The average weight of dystocia deaths was 10kg for males, and 9kg for females. However, small size played a part in deaths related to weather where the average weight of male progeny dying was 5.83kg. There was one case of non-viable lightweight twins.

Figure 1: Weekly frequency of calving events, and calf deaths.

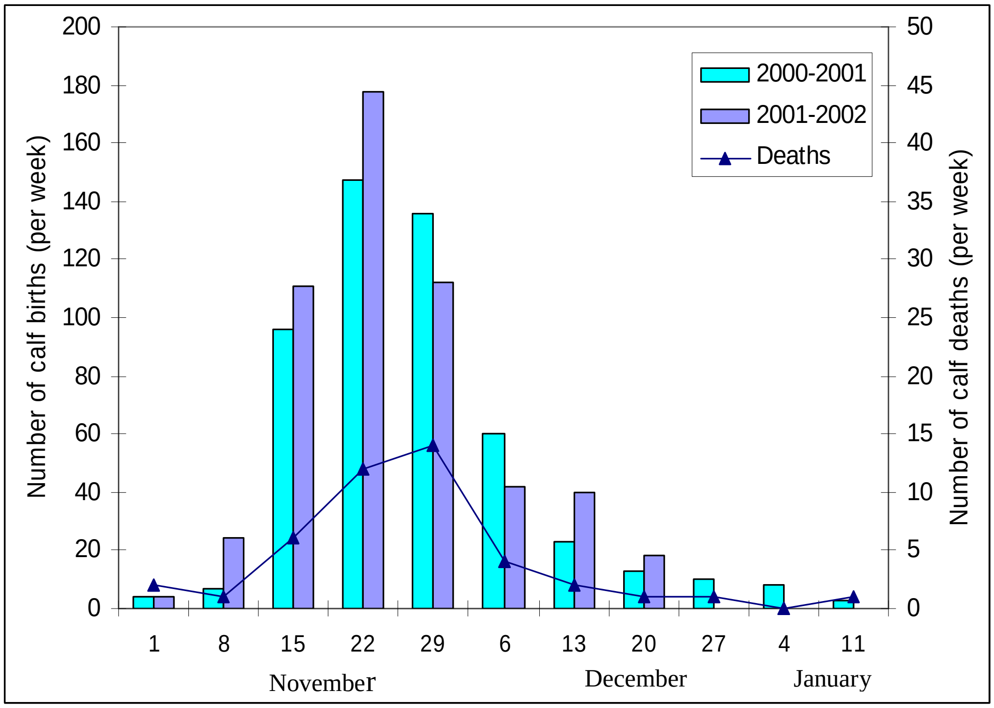
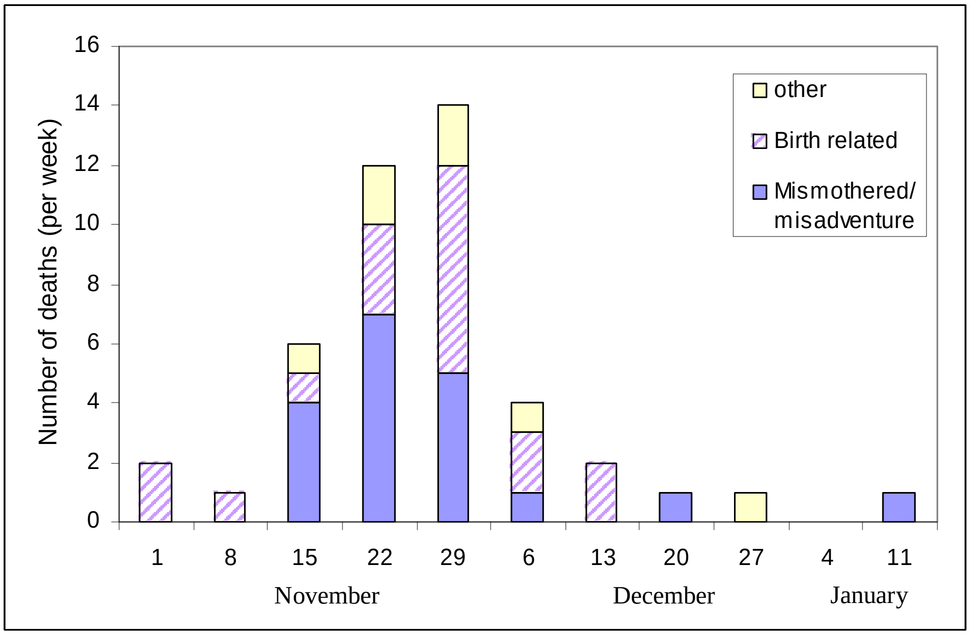


Figure 2: Number of calf deaths per week for both calving seasons combined, and cause of death.



Discussion

Overall calving losses, while not acceptable are less current industry averages and appear to be on the decline in this intensely farmed environment.

We recognise that some losses are inevitable but the loss patterns reflect the limits imposed by the nature of the farm at calving. The ability to separate from the mob and move as far away as possible has been shown to be important as part of the calving behaviour (Pollard & Drewry, these proceedings). Earlier work (Asher & Pearse, 2002) showed that if given the opportunity during calving, separation distance at least doubled and the hind seeks isolation and seclusion for at least 12 hours pre-birthing and over the bonding period.

Given the loss patterns seen in this study, dystocia and mismothering effects are confounded by hind to hind interaction, and casual and/or deliberate disturbance, despite relatively low stocking densities (6-8 hinds/ha).

Intensive management demands may have added to this pressure through concentrating hinds with similar calving dates in small groups such that over 70% of births occurred within a 20 day period. The peak calving week had up to 25% of animals in AI programmes calving in a 3-4 day period. This may well be ideal for lactation management but has some additional risk from management, poor weather and a greater degree of disruptive social interaction.

Paddock features can clearly be enhanced by the elimination of hazards within the calving grounds such as mud holes, under-runners, swamps and obstacles (trees/rocks).

In intensive situations where calving data is recorded a clear routine and time based pattern needs to be followed precisely. Culling hinds that respond nervously to farmer presence or such disruptions, may settle the group and create a greater tolerance and herd well-being.

Weather patterns – thunderstorms or un-seasonal cold snaps can certainly kill neonates. With an increasing emphasis on shelter, cover and protection from extremes, losses will be reduced (Pollard, these proceedings).

This study has confirmed other work that has indicated losses are mainly in the first 24-48 hours of life, or through disturbance during the birthing process. This leads to the conclusion that enhancing the environment and reducing hind to hind disturbance are essential steps to reduce calf wastage in modern deer farm systems.

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