Reproductive investigation : peri-natal losses

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Abstract

Farmers have taken on board the findings of the results of studies over the last 6 years and have improved hind conception rates significantly. We are still seeing a large loss of potential income through high fawn deaths at and around calving time. The ability to improve on this is limited due to the high number of variables between farms and regions of New Zealand and the uncertainty as to what is the definitive cause of the loss on the individual properties.

This case scenario is an investigation of a "commercial" property concerned with peri-natal calving losses. Data has been considered from 1998 to 2001. Conception rates have improved from 79% in 1998 to 95% in 2001 inclusive of MA and R2YO hinds. Despite these increases the overall fawning percentage has remained relatively constant.

The 2001 reproductive efficiency (fawns weaned/hinds mated) was 86% in the MA and 71% in the yearlings. There is a range in the R2YO reproductive efficiency of 64% to 83%. These losses are occurring primarily in the first week of calving. 1998 figures were 85% and 62% respectively. Increased observations and recordings were taken on the property during the 2001 calving.

A risk analysis of the possible causes has been considered and where the risk is assessed as high, remedies implemented. There are more questions than answers in some areas and several to focus on in the 2002 calving.

Property profile

Criffel is situated 10 minutes south east of Wanaka. 450ha of 2024ha is currently deer fenced with the first 500ha of tussock country being brought into deer production later this year. Approximately half of the flats and terraces are under irrigation, providing some stability to the operation in an area where you can not reasonably rely on summer rain. The annual rainfall is 650mm.

Criffel is in a development phase. The physical development of the property has had a lot of input in the past 12 months with conversion of sheep fences and also intensification of existing deer fences. K-line irrigation provides more efficient water to the pastures and a soil profile on all paddocks was carried out with appropriate fertilizers being applied.

Stock profile

The property is primarily focussed on venison production aiming for the spring schedule with a carcass weight >50 kg. The herd is based on Hungarian genetics with an average adult hind weight of 117kg. Currently 40 % of the hinds are R2YO. This puts increased pressure on production results with such a young hind base, but will optimise production in the next few years. In 1998, 183 hinds were farmed but in 2001, 620 were mated. Eighty R2YO hinds and sire stags are purchased annually. The animals are physically run in two separate herds on separate areas of the farm with their own yards. Other than the sire stag purchase, no deer enter the ""elite"" herd entity. The "elite" herd provides replacements for the "commercial" herd. This is to minimise the risk of TB and Johnes Disease.

Management profile

The primary reason for the ongoing investigation is to increase profitability by increased venison/ha and by re-evaluation of the costs of production. The farm management program is based on growing, utilisation and conversion of grass to meat. Peri-natal losses are the sum of a large number of factors and a brief background provides a basis for discussion.

Grow grass

Growing grass requires good pastures, the appropriate nutrients and water. The property has had a pasture renewal program using pasja, chicory, red clover and permanent pastures seed

mixes suited to either irrigated pasture or dry land. All paddocks or blocks have been soil tested and lime and fertiliser applied at recommended levels. Water is applied via flood irrigation, gun or K-line. Approximately half of the flats and terraces are currently under irrigation.

Utilise grass

We have benchmarking schemes for production values and the value of these will tailor off as farmers leverage themselves up the ladder and we approach the deer's biological potential. This is a large area in which we will look to maximise the use of that grass linked with the stock policy to add the most to the profitability. An average rate of 60 % is suggested for utilisation of grass on an average sheep farm and it is suspected it would be similar on Criffel.

Criffel is at the early stages of improving pasture utilisation. Subdivision of large blocks is enabling improved pasture management, staff are working on feed planning skills and gaining experience as we become familiar with the new deer territory. The property was under-stocked in 97-99 and overstocked in 00/01. The decision was made to carry extra hinds in 00/01 and accept the lower production in order to be able to hold onto capital stock.

Convert grass to meat

Genetics

The herd base is Hungarian and this will continue until numbers reach the property limit. The "elite" herd is performance recorded using "Studfax" and provides female replacements for the "commercial" entity. The herd is young with the oldest hinds seven years of age.

The stags are purchased using Estimated Breeding Values. Performance rankings are starting to provide useful information for matings.

Management

Recordings include date specified weights, condition scores, scanning (foetal aging) and bagging pre-calving and at weaning.

Recommendations from recent studies form the basis of mating management

Animal health

The "elite" herd is almost a closed herd with the only entry being a sire stag purchase. The property has a Tb classification of C3. Tb is an ongoing threat and there is a large vector trapping program in place. The hinds and stags are drenched once a year and the weaners drenched at weaning and thereafter as determined by faecal egg counts. Vaccinations include 5-in-1 Clostridial pre-calve and "Yersiniavax" is given to all the weaners.

Trace element supplementation includes Selenium pre-calving and at weaning. Copper supplementation has been nil for the last four years and the liver levels have regularly been measured at levels below 50 umol/l. Regular monitoring is carried out via either Optigrow or liver biopsies. Growth rate has been recorded monthly over the past four years with no concerns of low rates and there have been no clinical indications of copper deficiencies. It will continue to be closely monitored.

Reproductive investigation

A summary of the results comparing scanning rates (June) and reproductive efficiency (calves weaned/hinds joined) of MA hinds and yearling hinds shows the improvement of scanning rates from 1998 to 2001 is shown in figure 1. This was a result of management changes using the work of Audigé and Wilson at Massey University. It has not translated through to fawns on the ground due to the fawn losses occurring at calving. Summary data are presented in

Table1. This is the main reason for the trial initiation in 2001 ie to look for definitive reasons for these losses.

Figure 1. Comparison of scanning rate and reproductive efficiency for MA hinds & yearling hinds

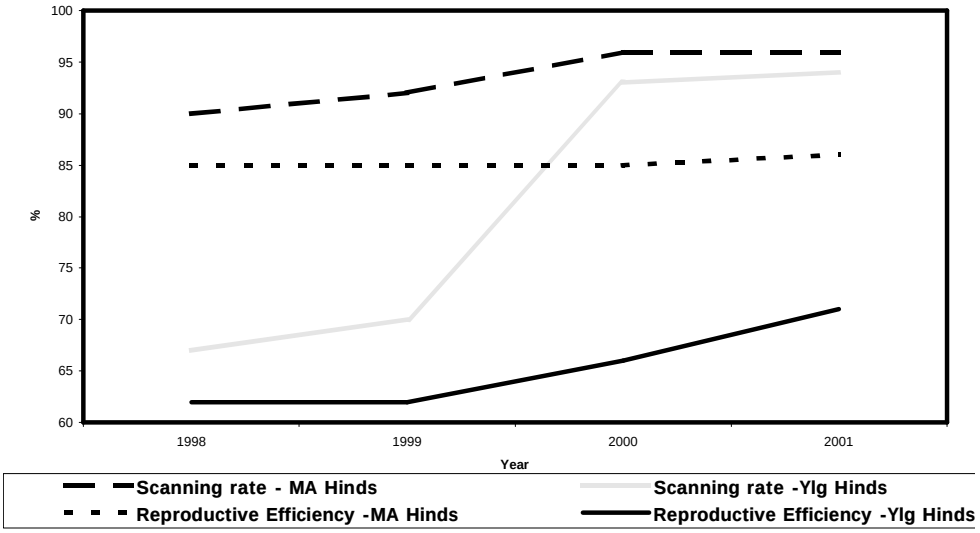

Table 1. Reproductive results 1998 to 2000

Year	1998	1999	2000
Hectares	100	100	100
Number of hind joined	183	319	451
SR/ha	9	11	14
Scanning-Hinds %	90	92	96
Scanning-Yearling %	67	70	93
Losses-scanning to calving %	1.4	-	1
Weaning %*-Adults	85	85	85
Weaning %*-Yearling	62	62	66
Comments	TB diagnosed, culled pre-calving, 6-monthly test	Alter management for mating yearlings	Dry, high S/R

* Number of calves weaned/no hinds joined

1998

100 hectares was deer fenced and the weaning percentages were lower than the survey data average(MA 88% and R2YO 70%). The significant event this year was TB.

Testing was carried out every 6 months and was aggressive. A test was carried out pre-calving that elicited a high percentage of avian reactors in the mob that had the initial confirmed reactors. The mob of 60 odd were all culled even if pregnant. Two positive tuberculous animals were found on postmortem.

1999

The R2YO hind scanning result was still only 70%. Management strategies to improve this were implemented the following year. The weaning % was lower with a primary reason being

shifting of stock in early January with fawns being left behind in the paddock. A combination of other factors were involved as discussed for subsequent years.

No bagging (checking of udders) was carried out pre-calving but a check for dry/dry hinds at weaning revealed less than 1% loss during pregnancy.

2000

An improved R2YO scanning result was due to changes in management. There was no change in losses between calving and weaning despite being very careful in the shifting of stock in early January (no fawns left behind in cover). The stocking rate was high as the fencers were unable to get posts into the hard Central Otago ground to bring in new pastures.

It is likely that the stocking rate affected results with lower feed levels at lactation and the need to calve mobs in adjacent paddocks. We were unable to recover all of the dead fawns even though every foot of ground was covered. This is a recurring problem and has been reported in studies at Massey and Invermay.

This prompted a search for definitive answers on causes of peri-natal losses and to seek improvements in the weaning%.

Table 2 summarises the factors considered in 2000. If the possible cause was assessed as low risk then no further action was taken. A medium- or high-risk assessment required a remedy or further investigation.

Table 2. Criffel peri-natal loss risk analysis

	Possible Cause	Analysis	Risk Assessment	Action if high
Scanning	Accuracy	Good operator	Low	
	Early fawning date	MA / R2YO	Low	
Abortion	Lepto, Toxo	Unknown	?	Must bag pre-calve
Feed	DM/ha	1200 to 2300	Low	
	Quality	Good	Low	
	S/R	13	High	Fencing
Trace Elements	Copper	Monitored	Low	Continue monitoring
	Selenium	Pre-calve	Low	
	Vitamin E	No effect elsewhere	Low	
	Iodine	?	?	Trial (See Wilson et al)
Vaccines	Clostridia	Pre-calve	Low	
Management	Calving sites	Variable	Medium	New areas observe
	Herd Composition	Mixed 1 mob	High	Do not mix groups
	Interference	Irrigator	High - R2YO	No change
	Shifting	Jan 1 onwards	High	Staff awareness
	BCS	Scanning/pre-calve	Low	
Misadventure	Calving next door	On "elite" unit	High	Decrease S/R
	Crop	Nil	Low	
	Long Grass	Some	High	Mow outside fence
Dystocia	Interference	Calving of hinds	Med	Calculated risk
	BCS < 4	2.5 to 4 CS	Low	
	Sire Effect	Hungarian sires	Med	Planned matings
Starvation - stress	Mismothering	R2YO	High	Lower interference
	Savage Fawn	Known cause	High (R2YO)	Monitor from distance/ maturity assessment

	Possible Cause	Analysis	Risk Assessment	Action if high
Starvation - maturity	R2YO weight at calving - ratio	Cause of low rates in lighter "commercial" animals (lactation onset/mothering)	High	Look at drys vs weight

2001

An investigation was initiated into the effects of iodine on losses and increased environmental and management observations were taken.

Investigation of reproductive performance 2001

An investigation of many aspects of calving and calf survival was implemented. One aspect was to investigate the potential role of iodine. This study is presented elsewhere in these proceedings (Wilson et al).

Calving observations

Calving was observed every second day from late October to mid December.

The animals in the trial were put into five groups for analysis according to their age and "elite" or "commercial" status:

Table 3. Calving mobs 2001-2

Hind group	No. of mobs	Total no. animals when iodine injected (August)
"Elite" MA hinds	4	175
"Elite" yearling hinds	1	53
"Commercial" MA hinds	3	199
"Commercial" yrlg hinds	2	104
"Commercial" (yearling + MA)	1	56

Three paddocks were involved in the intensive observations with a total of 199 MA animals. The "commercial" MA hinds were allocated to three mobs. One of 109 was injected with iodine, and two mobs of 45 each were not injected with iodine.

Observations included: weather, mob activity, individual hind activity, location of hinds, location of fawns, number of fawns outside fences and location, postmortem of dead fawns and those relating to the iodine trial. Individual animals were identified in all mobs.

The R2YO hinds were not closely checked, to minimise the potential effect of human interference. In retrospect it would have been very useful to have done so as the 3 "commercial" mobs (2 yearling and 1 mixed) lost a total of 43 fawns. Was this primarily due to dystocia, starvation or misadventure. Only 13 fawns were found when the paddocks were checked in January (including neighbouring paddocks of wheat and pasja). Where were the others? This problem of "evaporation" has been reported in other studies. Possible explanations include ferrets, dogs, dams eating, theft, hidden/disintegration.

Reproductive outcomes for weaning 2002 are presented in Table 4.

Table 4. Reproductive results of 2002 weaning

Mob	"elite"	"commercial"
Hind Number	245	372
SR/ha	17	17/ 9
Scanning-Hinds %	94	97
Scanning-Yearling %	93	95
Losses-scanning to precalving	1	1
Reproductive efficiency* -Adult%	83	88

Reproductive efficiency* -Ylg %	83	64
Comment	Dry, new fencing, iodine trial	MA terrace observations, R2YO on "elite" unit

* Number of calves weaned/number of hinds joined

The points of interest for 2002 weaning were the increase in the weaning percentage in the R2YO "elite" mob but not in the R2YO "commercial" mob. The latter were run with the same management as the "elite" groups that weaned at 83%. The overall reproductive efficiency was 69% for the yearlings. Data is presented in Table 5. The primary difference between the 2 groups was the average hind weight. The other point to note is the disappointing weaning of the mixed age "elite"s.

Table 5. Weaning 2002 data for "elite" and "commercial" 2YO

MOB ID		"commercial"	"elite"
Scanned	Total No	57	55
July 16th	Pregnant	55	51
	%	96%	93%
Precalving check	Total No	53	53
October 19th	Pregnant	52	53
	%	98%	100%
Fawns weaned/hinds scanned	%	64%	83%
Dead fawns found in paddock		10	2
Assisted Calvings		2	0
Hinds Dead in Paddock		3	0
Total dead fawns accounted for		15/19	2/9

The difference in hind numbers is due to culling of the dry hinds. The "commercial" hinds had a higher dystocia rate and as previously noted there were likely to be dead fawns from hinds that managed to calve but had a prolonged calving resulting in calf mortality.

Hinds were combined post-bagging in January, as it appeared that fawns remained in cover in paddocks when brought in to the yards. This eliminated the risk of early weaning for those left behind. Further analysis of results of these two mobs is discussed under starvation/maturity.

Comments on medium- or high-risk assessments noted in the Risk Analysis chart table (Table 1)

Abortion – hinds were bagged pre-calve and a 1% dry rate was noted. The losses were not associated with abortion.

S/R - high but made decision to compromise and run with it as the property is increasing hind numbers. The mobs calved in paddocks next door to each other. This probably contributed to the fawn movements between paddocks.

Copper and Selenium – these were monitored. Selenium was given to the hinds pre-calving. Three liver biopsies were performed on fawns post weaning. Results are presented in Table 6.

Table 6. Liver Copper and selenium concentrations from weaners, March 2002

Animal ID	Liver Se (nmol/kg)	Liver Cu (umol/kg)
1	650	39
2	610	310
3	1370	110

Weights - Growth rates are similar to previous year rates. The overall weaning weights of the fawns are up on the previous year.

Iodine – no response to iodine supplementation was observed.

Herd composition - The "commercial" mixed hinds had a lower weaning percentage. They were in a mixed adult and yearling mob. This is a factor recognized to have caused lower results in previous years. Previous studies support the theory to not mix groups and this is policy when possible, but this option was not available this season.

Misadventure - Eight fawns were post-mortemed with four from the intensive trial in the MA hinds. Causes of death included dystocia, starvation, misadventure and 3 unknown. Two fawns died of injuries; one with a fractured leg and the other fence injuries.

There was a lot of movement of fawns through fences. This was apparent in mid January when the hinds were brought in for bagging and a fawn count completed. The tally of wet/dry did not equal the fawn count for each mob. At weaning on 22 February the fawn count was higher than that in mid January which confirmed suspicions that fawns remained in cover when the hinds were mustered.

Only the "commercial" MA hinds were regularly checked for calves outside fences and a high number were put back into paddocks. Six calves of 203 (3%)"elite" and 8 of 181 (4.5%) "commercial" hinds were replaced after being found outside their paddock The tally would be higher if all mobs had been checked. This occurred in both intensive (average size 4.5ha), and extensive paddocks(18 ha). Studies with similar observations put this as a significant cause of loss of calves.

The point where the calf left the paddock was recorded. The calves all moved through the fence in the calving area and this will be looked at next year to see if they calve again in the same places. The use of this type of observation to the farmer may be that only a portion of the paddock might need to be fenced with calf-proof netting to limit this loss. The other practical application to carry forward will be to mow where applicable the long grass on the other side of the calving paddocks. The high losses in the "commercial" yearlings in one group could have been affected by the growth of a pasja crop next door and in the other group by the wheat crop. Both paddocks were extensively checked for dead calves and not all were accounted for.

Dystocia - The sires are Hungarian of 190kg so matings must always take this into consideration. Six hinds were assisted and five died during calving. This gives a known dystocia rate across the whole herd of 617 of 1.8%. Half of the problems were in the lighter "commercial" R2YO hinds. This needs to be addressed for 2002.

Starvation/maturity - Previous studies have noted the effect of low R2YO weights at mating on conception rates. The weight suggested in studies for R2YO hinds is maturity at 60% of mature bodyweight in red deer and wapiti. A threshold of 65 to 75kg was suggested by Fennessy et al. (1986). The industry has increased the conception rate of R2YO hinds through a number of management tools. However, this has not greatly reduced calf losses. Over recent years there has been further increases in hind bodyweight through the continued introduction of European genetics.

Table 7 below shows mobs with their weaning percentage in relation to the bodyweights of the dry hinds and the bodyweights of the mob average pre-conception. The interesting figures are those for the "commercial" R2YO hinds. These mobs were allocated to mobs based on their lower liveweight. They were the mobs with the low weaning rate and the dries were the lighter animals in the mob. There are other factors involved but there is a possible trend that would be interesting to further investigate in 2002. Are these lighter animals late in the onset of their lactation causing fawns to starve or are they abandoning them? Could a percentage

Comment: all table numbering was out of sync – one short. Have changed legends and text.

figure be put on the bodyweight pre-conception at which the farmer could reasonably expect the R2YO hind to raise a fawn through to weaning.

Table 7. Comparison of average weights of dry hinds and of mob

Hind Group	Average weight of drys	Average weight of mob
"Commercial" MA hinds	114	110.5
"Elite" MA hinds	112	113
"Elite" ylg hinds	101	99
"Commercial" ylg hinds	89	96

Calving sites - Observations were made every second day on the location of the hinds and fawns in the paddock. The animals were checked at different times during the day. The animals had four definitive areas that they lived in: calving, resting, grazing and the area they moved to on some occasions when disturbed. The location of the calving sites was specific in one area for over 90% of each mob.

The mob of 109 hinds was in a 17.7-hectare paddock. This paddock appeared to have all the desirable attributes for calving according to previous studies (summarised in a paper by J Pollard in this proceedings). There is a face covered in long standing manuka, briar, long grass and rocks with the manuka leading onto the flatter terrace. The terrace part of the paddock is undulating grasslands and the upper fence line borders the tussock blocks on the extensive hill behind. The hinds chose to calve in the grass within 20 metres of the upper fence boundary with no cover other than the longer grass. 10% of the hinds calved in the manuka cover on the periphery of the grass terrace. The only human interference within the paddock was the observer on the same bike that the hinds were very familiar with. There were movements above the fence line where the hinds calved with motorbike farm tours going past once or twice a day.

The second mob of 45 calved in a flat paddock (5.6 ha) at the bottom of this terrace. This paddock had a farm cottage at the western boundary with significant daily activity. On the southern fence line was the track to the cottage with daily car movements. The cover in this paddock was the long grass throughout the paddock and an old irrigation ditch. The majority of the hinds calved within 15 metres of the southern fence line ie next to the track. Thus, they chose the area with the most human movement. The only factor that could have some relevance is that this area is closest to the hill behind.

The third paddock with 45 hinds was 9.45 ha and similar in cover to the 17.7 ha paddock. The area of grass terrace is smaller. This mob was more "typical" in that the fawns were well hidden in the cover and difficult to locate.

Calves were replaced from the wrong side of the fence line in the first two paddocks.

Observations will be made this year of these three calving paddocks to see if the above observations are repeated.

Calving 2002-3

The following recommendations are to be carried through to calving in 2002:

- Long grass outside fence lines is to be mowed.
- No calving is to take place adjacent to crops.
- No mobs are to calve on the flat paddocks next to another mob.
- MA and yearling hinds are not to be mixed.
- Any yearlings that are new to the property are to remain in their groups of origin.
- Fawn movements through fences are to be monitored and replaced.
- Consider fawn proofing the area of paddock if hinds calve in similar areas to 2001.

Other considerations

Areas to consider for further investigation include:

- Environmental observations and comparisons between the extensive hill, terraces and flats.
- Maturity and weight ratio of R2YO hinds.
- Fawn disappearance.

There must also be an acceptance that production results in 2002 are due in part to the high proportion of the herd being R2YO hinds and that a significant number of these hinds were new animals to the property.

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