Impact of post weaning growth rate on farm profitability

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1. CLIENT SUMMARY

- Finishing deer to meet the payment schedule peak in October, is a challenge for many farmers due to biological limitations in deer growth during winter.
- Autumn presents an opportunity for increasing growth rates as there is currently high growth rates variability achieved over this period.
- Stress during the weaning process is assumed to be a major contributing factor in poor post-weaning performance.
- A farm systems analysis was performed to investigate the impact of different weaning practices or outcomes, by using differing autumn post-weaning growth rates, on farm profitability using real farm data.
- Growth rate data from the Deer Progeny Test (DPT) was used to mimic different rising yearling performance levels for four months immediately post-weaning.
- Two DPT farms, Invermay and Whiterock Station, were modelled over two years to provide different levels of performance and scale to the analysis.
- The different growth rates post-weaning from the bottom 10th percentile of animals to the 90th percentile decreased average sale date by an average of 42 days across both farms and years.
- The different growth rates also resulted in an increase in average rising yearling carcass weight by an average of 3.8 kg across both farms and years.
- Considerable increases in profit were achieved in this analysis.
- As weaner growth rate increased during autumn the demand for feed also increases and depending on the feeding system employed this may incur an additional cost which was not accounted for in this analysis.
- This analysis does indicate that increasing post-weaning growth rates has the potential to increase profit for farmers but this would depend on the weaning and feeding management systems.

2. EXECUTIVE SUMMARY

Finishing rising yearling (R1) deer to meet the market schedule peak in October is a challenge for many farmers due to biological limitations in deer growth during the winter. This leaves limited windows of opportunity for farmers to maximise growth rate, and hence carcass weight. Autumn is one area where a considerable opportunity lies for increasing growth rates. Currently autumn post-weaning growth rates in pre-rut weaning systems are highly variable and this is likely due to the lingering effects of chronic stress resulting from the weaning process. This can cause some deer to lose weight over the weeks following weaning, while other deer are capable of growing at 300-400 g/d. A farm systems analysis was performed to investigate the impact of this post-weaning growth rate on farm profitability using real farm data. Growth rate data from the Deer Progeny Test (DPT) was used to mimic different performance levels for four months immediately post-weaning. Two DPT farms, Invermay and Whiterock Station, were modelled over two years to provide different levels of performance and scale to the analysis. Increasing growth rates from the 10^{th} percentile of animals to the top 90^{th} percentile decreased time to slaughter by an average of 42 days (11.2%) across the two farms and two years while increasing average rising yearling carcass weight by an average of 3.8 kg (7% increase). In this analysis, the higher growth rates increased profit considerably. However, as weaner growth rate increased during autumn, so did the demand for feed and, depending on the feeding system employed, this may incur an additional cost that was not accounted for in this analysis. This analysis does indicate that increasing post-weaning growth rates has the potential to increase profit substantially for farmers but this would depend on the types weaning and feeding systems employed.

3. BACKGROUND

Venison is predominantly sold into a very seasonal market with a prominent schedule peak in September/October coinciding with the traditional European game season. Finishing farmers that aim to maximise profit grow their young stock as fast as possible to take advantage of this peak in the schedule. However red deer growth is heavily controlled by photoperiod and young deer experience a degree of seasonal inappetitence, during the winter months. This leaves limited opportunities to grow rising yearling (R1) animals to reach optimal weight for slaughter in October. Finishers therefore focus their attention on autumn and spring growth rates. Achieving high growth rates in spring is generally not limiting as there is plenty of high quality pasture available to the animal due to the seasonal growth pattern of pastures and the deer themselves are capable of high growth rates during the post winter period. However the autumn presents a number of issues around maximising growth rates, particularly around chronic stress associated with, and following, weaning.

Natural weaning of mammals occurs over an extended period of time to reduce stress for both dams and their progeny. However in the farming environment it is often not practical to allow for natural weaning to occur and therefore it is common practice to wean over a very short time period and usually at a much earlier age than natural weaning. This can make it a very stressful period for both dam and progeny. If animals are not managed appropriately to minimise this stress, it can have significant impacts on survival and performance of the progeny and consequently can affect farm profitability.

Red deer in their natural environment are weaned off milk at around 7-8 months of age but maintain an association with their dam for much longer. In a farmed situation weaning occurs anywhere from 3 (pre-rut) to 7 (post-rut) months of age depending on farm management. Stress to the animals during the weaning process can be considerable and depends on a large number of variables and management practices that can change from property to property. The performance of deer during and immediately after weaning also varies considerably across herds, from year to year. What works for one farm may not necessarily work for another farm. It is not uncommon for animals to lose weight for a month post-weaning. However the animal has the potential to grow at 300-400 grams per day over this period if given the appropriate environment and feed to express high growth rates. If farmers were better able to maximise growth performance of weaners over this period, there would be considerable opportunity to increase profit by decreasing time to slaughter and increasing carcass weight. This aligns with the often quoted adage within the industry that “the weight of deer by 1st of June (start of winter) determines their slaughter date”

A modelling exercise was used to assess the impact of different post-weaning growth rates on farm profitability in pre-rut weaning systems. This modelling exercise used real on-farm data that was collected as part of the Deer Progeny Test (DPT) and covers two of the three DPT farms.

4. METHODS

This farm systems analysis was completed using Farmax (Version 7). Farmax models were generated for both Invermay and Whiterock Station as steady state models over a one year time frame using actual farm data where possible.

Two years' worth of data from the DPT trial based at Invermay and Whiterock were used to generate ten growth rate profiles from pre-rut weaning through to 12 months of age for R1 red deer. The DPT data was averaged for all red deer progeny within each year into five male and five female monthly growth rate profiles. The growth rate profiles were used to simulate variable post-weaning practices or outcomes and were based on the mean, the 10th percentile, the lower and upper quartile, and the 90th percentile of the data for each year by farm. Growth rates in the models were adjusted according to these five profiles for four months immediately post-weaning (up until the end of June) with the remaining growth rates thereafter following that of the average animals from the corresponding farm and year (Figures 1 and 2). However in the DPT, progeny were slaughtered as one group at a predetermined time (in October or November depending on year and farm) and hence actual growth rate data for November onwards was non-existent for these cohorts. Growth rates were therefore estimated from previous farm data from November onwards.

The Invermay models were based on a deer only model as at the time of the DPT trial there was limited interspecies grazing on the farm. Financial information used in the models for Invermay used current known industry standards as Invermay is a research farm and has considerably higher cost associated with it. Adult hind numbers (525) were kept as close as possible to the actual numbers run on farm. Reproductive performance was set at 95% pregnancy rate and 87% weaning rate. Weaning weights and growth rates, as mentioned previously, followed those obtained in the DPT trial. All young deer were sold prime, excluding 100 replacement hinds (19% replacement rate). Fortnightly sales were made from 16th September onwards for animals above 95kg live weight. All remaining males were sold (quit) by the 20th January and females by the 9th of February.

The Whiterock Station models were based on a Farmax model that was used for another research project and was setup by a commercial farm consultant in consultation with the farmers. Some animal, supplement and expense numbers were adjusted to ensure that it was a steady state model and that financial input information reflected those reported at the public field days held on farm in 2008/09. The models were based on a 1500 MA hind herd and 250 MA Angus cow herd. All cattle calves were sold store either shortly after weaning or prior to their second winter. Reproductive performance of the hinds was 95% pregnancy rate and 87% weaning rate. Weaning weights and growth rates were those obtained from the DPT trial data. A number (334) of female weaners were sold store prior to their first winter with the rest being sold prime. Fortnightly sales were made from 16th September onwards for animals above 95kg live weight. All remaining males were sold (quit) by the 20th January and females by the 9th of February.

Carcass weight and average sale date of young animals was calculated from the model data in a spreadsheet. All figures were graphed using SigmaPlot (Version 13).

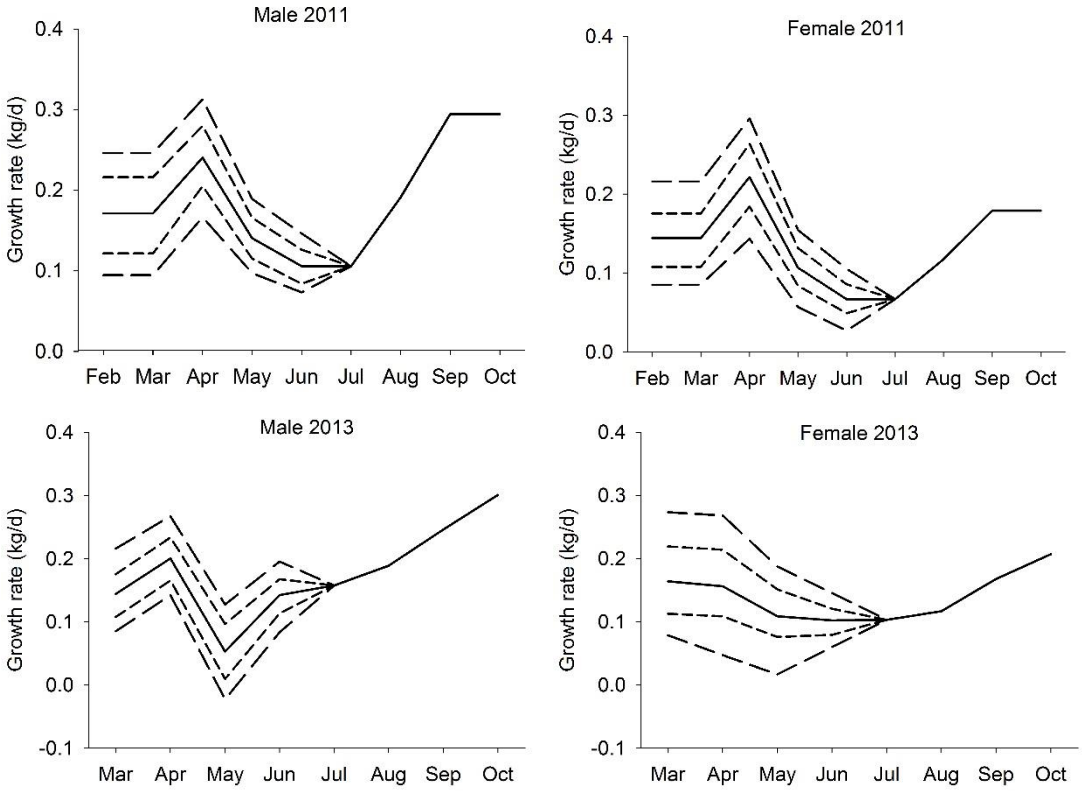

Figure 1. Average, lower and upper quartile, and the 10th and 90th percentile growth rates used to demonstrate the impact of post-weaning growth rate on farm profitability based on male and female red deer weaners from the 2011 and 2013 Deer Progeny Test birth cohorts at Invermay.

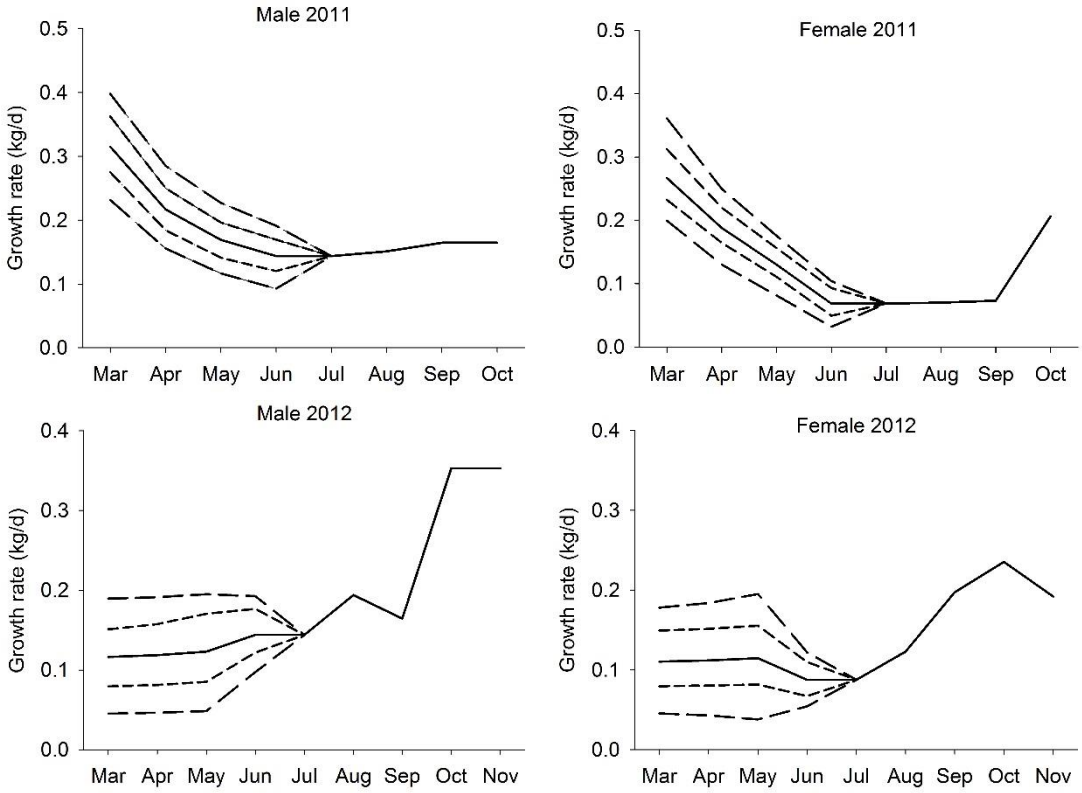

Figure 2. Average, lower and upper quartile, and the 10th and 90th percentile growth rates used to demonstrate the impact of post-weaning growth rate on farm profitability based on male and female red deer weaners from the 2011 and 2012 Deer Progeny Test birth cohorts at Whiterock Station.

5. RESULTS

Results are given separately for each farm with no comparison made between farms as both operate different farming systems, in different environments, under different financial structures. Comparisons between years are not considered, as weaning dates and weights, and post-weaning growth rates are all different. Different sire genetics were also used between DPT years so the growth potential between years is also likely to be different.

5.1. Invermay

Increasing post-weaning growth rate from the 10th percentile to the 90th percentile resulted in a 179% and 218% increase in profit before tax in the 2011 and 2013 birth years respectively across the whole farm (Table 1 & 2; Figure 3). This extra profit was a result of a shift in the kill profile and a reduction in the number of animals that were quit at the end of the slaughter season below the target weight (i.e. <95kg live weight). The average sale date shifted by 38 and 49 days respectively for 2011 and 2013 years while the average carcass weight increased by 3.3 and 3.4 kg for 2011 and 2013 birth years respectively.

Table 1. Farm profit, rising yearling deer average carcass weight at slaughter and average slaughter date for five different modelled post-weaning growth rates using the Deer Progeny Test live weight gains as a base as achieved at Invermay for the 2011 birth cohort.

	90th percentile	Upper quartile	Average	Lower quartile	10th percentile
Farm profit before tax ($)	53,398	47,621	40,790	35,125	29,778
Farm profit/ha ($)	373	333	285	246	208
Average carcass weight (kg)	56.0	55.1	54.3	53.4	52.7
Average slaughter date	02/11/2015	11/11/2015	22/11/2015	02/12/2015	10/12/2015

Table 2. Farm profit, rising yearling deer average carcass weight at slaughter and average slaughter date for five different modelled post-weaning growth rates using the Deer Progeny Test live weight gains as a base as achieved at Invermay for the 2013 birth cohort.

	90th percentile	Upper quartile	Average	Lower quartile	10th percentile
Farm profit before tax ($)	56,334	49,522	39,387	34,624	25,790
Farm profit/ha ($)	394	346	275	242	180
Average carcass weight (kg)	55.4	54.7	54.0	53.2	52.0
Average slaughter date	30/10/2015	12/11/2015	25/11/2015	08/12/2015	19/12/2015

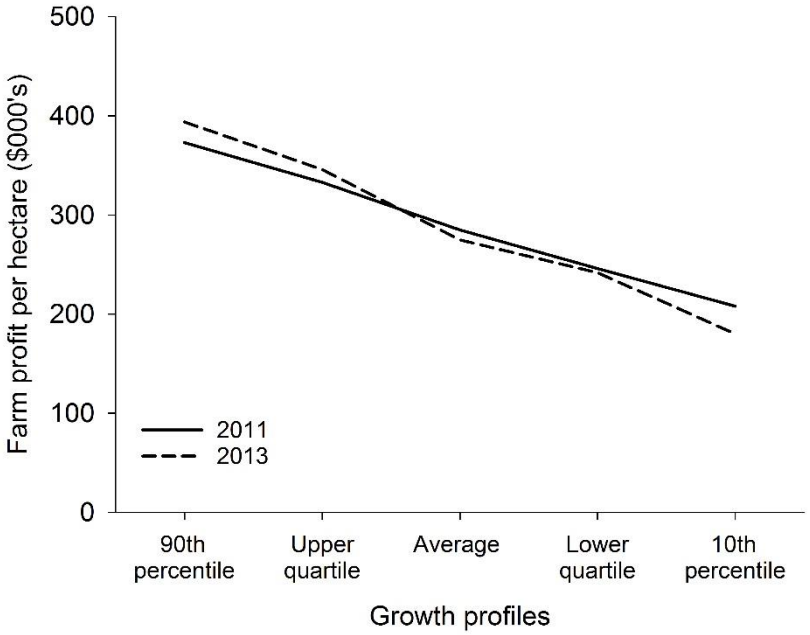

Figure 3. Modelled farm profit per hectare before tax for Invermay deer farm using five different post-weaning growth rate profiles across two birth cohorts. Based on actual growth rate data achieved in the Deer Progeny Test on Invermay.

5.2. Whiterock Station

Increasing post-weaning growth rates from the 10th to the 90th percentiles at Whiterock Station resulted in profit increases of 157 and 165% for the 2011 and 2012 birth years respectively. The increase in the farm profit was a function of finishing deer earlier, at heavier carcass weights when schedule prices were higher. Average carcass weight increased from 53.7 to 58.2 kg in 2011 and from 50.3 to 54.1 in 2012 for the 10th and 90th percentiles respectively. Average days to slaughter decreased from 358 to 320 (38 days) for 2011 birth cohort and from 383 to 335 (48 days) for 2012 for the 10th and 90th percentile groups respectively.

Table 3. Farm profit, rising yearling deer average carcass weight at slaughter and average slaughter date for five different modelled post-weaning growth rates using the Deer Progeny Test live weight gains as a base as achieved at Whiterock for the 2011 birth cohort.

	90th percentile	Upper quartile	Average	Lower quartile	10th percentile
Farm profit before tax ($)	222,507	201,121	179,788	160,583	141,773
Farm profit/ha ($)	148	134	120	107	95
Average carcass weight (kg)	58.2	56.3	55.1	54.1	53.7
Average slaughter date	27/09/2015	03/10/2015	13/10/2015	23/10/2015	04/11/2015

Table 4. Farm profit, rising yearling deer average carcass weight at slaughter and average slaughter date for five different modelled post-weaning growth rates using the Deer Progeny Test live weight gains as a base as achieved at Whiterock for the 2012 birth cohort.

	90th percentile	Upper quartile	Average	Lower quartile	10th percentile
Farm profit before tax ($)	164,666	150,434	132,064	116,047	99,751
Farm profit/ha ($)	110	100	88	78	67
Average carcass weight (kg)	54.1	53.6	53.2	52.8	50.3
Average slaughter date	18/10/2015	28/10/2015	11/11/2015	23/11/2015	05/12/2015

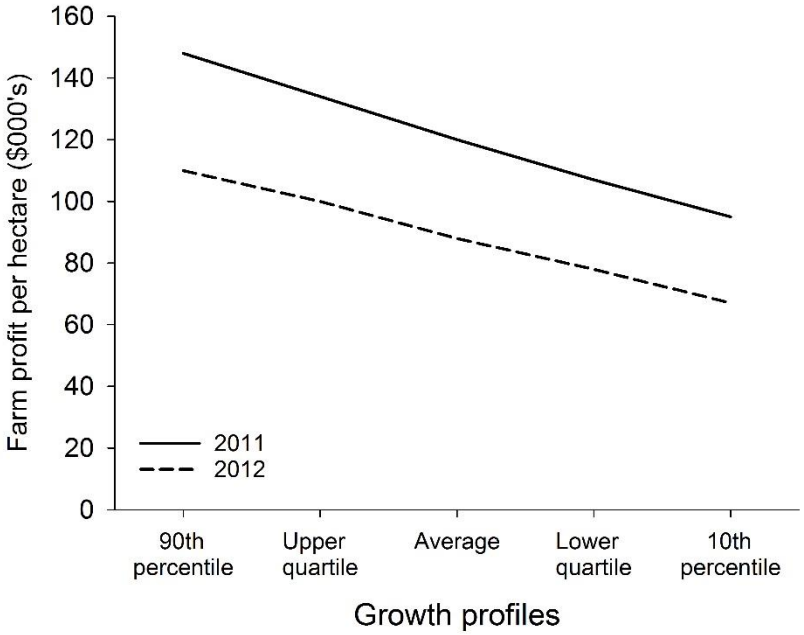

Figure 4. Modelled farm profit per hectare before tax for Whiterock Station red using five different post-weaning growth rate profiles across two birth cohorts. Based on actual growth rate data achieved in the Deer Progeny Test on Whiterock Station.

6. DISCUSSION

This farm systems analysis demonstrates that improving post-weaning growth rates for pre-rut weaning systems presents a good opportunity to increase profits. These profits are realised through the earlier slaughter dates, more animals slaughtered at peak schedules and increased carcass weights.

It is important to recognise that increasing weaner growth rates in autumn will increase demand on autumn feed supply. Depending on the feed supply profile and/or surpluses during autumn, extra feed may need to be introduced into the system to allow for the extra weaner growth. The cost of this extra feed would need to be accounted for to ensure that it does make economic sense to increase weaner growth rates during autumn. For example using the model developed for Invermay 2011, 22 and 40 tonnes of additional DM is required during autumn for the upper quartile and 90th percentile models, respectively, to maintain pastures covers similar to those in the average model. Filling this feed deficit may only be required in the transition year as extra feed in spring should become available due to the earlier selling date of the weaners and can be carried forward into the following autumn to support the higher growth rates through the use of summer crops or conserved

feed. Alternatively, the extra feed may allow extra body condition to accrue in the breeding hind herd to support an improved lactation or other livestock classes, such as store lambs, maybe bought to utilise the extra feed during the growing period and therefore add to total farm profit.

However another contributing factor to post-weaning growth that needs to be considered, is that stressed animals may require more feed to maintain homeostasis than non-stressed animals. At the same time, due to the behaviour of deer while stressed (e.g. pacing), utilisation rate of feed may decrease. Both of these factors may be major contributors and, if so, more feed may not be necessary to support faster growth as utilisation of feed may increase and maintenance requirement may decrease in non-stressed well growing animals. This area needs more investigation and is the subject of a future research project.

Another point to consider is that less than ideal weaning practices can result in significantly poorer live weight gains than those modelled here. The data used for this modelling represents some of the best sire genetics in the industry and therefore many commercial practices may not even achieve these growth rates, even with best management practices employed at weaning. It is important to understand that growth rates achieved through increased animal intake were the only factor changed between the models. Often when less than ideal weaning management is used there is a combination of poorer growth performance along with increased death, injury or disease rates cumulatively impact on farm performance to a much greater level than the modelled scenarios. Death rates were not modelled but can be as high as 10% of the herd, particularly if there is an outbreak of Yersiniosis or other diseases like *Fusiformus.* There are other potential longer term impacts of disease or poor growth rate post-weaning that may persist well beyond winter and even impact reproductive status as rising two year olds.

Overall, this farm systems analysis shows that increasing post-weaning growth rate in a pre-rut weaning system, decreases the time to slaughter (and on farm), and increases carcass weight, hence maximising the number and weight of animal slaughtered at peak schedules. It therefore has the potential to greatly increase profitability of venison production systems. As post-weaning stress is considered to be an important contributor to poor post weaning growth, identifying the factors that reduce stress to promote increased live weight gains post-weaning are warranted.

7. RECOMMENDATIONS

- That producers measure and understand their post-weaning growth rates, and see if there are opportunities within their farming system to ensure more feed is available in autumn to increase post-weaning growth rates in pre-rut weaning systems.

- That both producers and researchers investigate non-disease factors that reduce growth rates in autumn for rising yearling deer, which may include different weaning management options.

- That the impact of stress on growth rates and feed intake of rising yearling deer is researched to obtain an understanding of the biological impacts of post-weaning stress and ways to reduce or minimise such stress.

8. ACKNOWLEDGEMENTS

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