GLENSAUGH REVISITED

NUTRITION & GROWTH OF FARMED RED DEER IN-WINTERED ON EITHER HAYLAGE OR SILAGE

INTRODUCTION

This project arose from initial contact with the Interface Food and Drink (IFD) Initiative and its interest in increasing farmed venison production in Scotland. Following discussions with John Fletcher of BDFFPA, Donald Barrie at Glenshaugh and Graham Forbes of East Coast Vinters, Grain (ECVG), Drumtibie, Stonehaven, submitted a proposal, subsequently successful, for funding to IFD. This recognised the early developmental work on deer farming at Glenshaugh and the Rowett Research Institute, Lowland Deer Research at Rosemaund, Hertfordshire and was designed to update information on nutritional science of red deer. It also aimed to compare the utilisation of grass produced on-farm and conserved either as silage or haylage, by contemporary weaned stag and hind calves in a "case study" at Glenshaugh.

The project was further supported by the School of Biological Sciences, University of Aberdeen (Hugh Galbraith) and the involvement of two students: Rosemary Hurley (MSc) and Bethany Macdonald (BSc Honours).

What follows is a brief summary of the larger report available on the BDFFPA website www.bdffpa.org.uk

DESIGN OF THE STUDY:

Twenty stag and 20 hind calves were available. They were born between 15 May and 19 June 2015 at Glenshaugh, and following weaning on 12 October, were each divided into two groups of 10 and winter-housed in four separate pens. They were group-fed 1kg/head daily of an ECVG beef blend concentrate supplement which provided 12.7 MJ metabolisable energy and 150g protein per kg dry matter. Typical values for composition (g/kg dry matter) for metabolisable energy and crude protein were for pit silage (12.1MJ and 11.6g) and haylage bales (10.1MJ and 8.1g). The deer were weighed fortnightly and food intake measured monthly from 27 October 2015 to 26 April 2016. Turnout was 5 May 2016. Initial liveweights averaged 58kg for stags and 52 kg for hinds.

Selected graphs and tables of results are presented along with images showing forage conservation and a group of stags in a pen, at Glenshaugh and members of the team at a project review meeting at Aberdeen University.

RESULTS

Growth: stags vs hinds; silage vs haylage.

The growth of the four groups of deer is shown in Figure 1 and Table 1. Average final liveweights were (kg) for stags 90.6 (silage); 88.0 (haylage); and for hinds 73.7 (silage); 72.4 for (haylage).

![Graph showing liveweight of stag and hind red deer calves fed either grass silage or haylage from end-October 2015 to end-April 2016.](image)

**FIGURE 1.** Graph showing liveweight of stag and hind red deer calves fed either grass silage or haylage from end-October 2015 to end-April 2016. (Week 8: 21 Dec; week 12: 18 Jan; Week 18: 29 Feb; Week 22: 28 Mar; Week 26: 26 April).
LIVEWEIGHT (KG)

<table>
<thead>
<tr>
<th></th>
<th>STAGS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SILAGE</td>
<td>HAYLAGE</td>
<td>SILAGE</td>
</tr>
<tr>
<td>Mean Final</td>
<td>90.9</td>
<td>88.0</td>
<td>73.7</td>
</tr>
<tr>
<td>Maximum</td>
<td>97.8</td>
<td>105.7</td>
<td>80.77</td>
</tr>
<tr>
<td>Minimum</td>
<td>82.7</td>
<td>72.4</td>
<td>68.2</td>
</tr>
<tr>
<td>Mean Initial</td>
<td>57.8</td>
<td>58.8</td>
<td>50.8</td>
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<tr>
<td>Maximum</td>
<td>65.5</td>
<td>68.0</td>
<td>57.0</td>
</tr>
<tr>
<td>Minimum</td>
<td>52.5</td>
<td>52.0</td>
<td>42.0</td>
</tr>
</tbody>
</table>

TABLE 1. Average values for liveweight gain (kg) for stag and hind red deer calves fed silage or haylage from end-October 2015 to end-April 2016.

Gains in liveweight (kg) were 32.8 and 29.2 (stags) and 22.9 and 18.6 (hinds) for silage and haylage respectively. The stags achieved significantly greater average liveweight and gains than hinds of the order of 17kg for liveweight and 10kg for gain.

In comparing the forage diets, deer calves grew well on both diets, although the relatively poorer nutrient composition of the haylage (from chemical and digestive evaluation) and cut when grass was more mature due to adverse weather, was reflected in lesser liveweight gains for both stags and hinds. However, the relatively large variation in performance and relatively small differences in final liveweights meant that the differences were not statistically significant.

Interestingly, the heaviest stag at 106kg was fed haylage.

It is notable also that the average final liveweights of stags were of the order of 90kg and approximating to slaughter weight by turnout and for hinds in excess of the suggested 70kg required for breeding.

Results from nutrient evaluation of the feeds, and applying "scientific rationing", can be used to plan diets to achieve production targets for venison production.

Factors such as metabolisable energy and protein requirements can be included in rationing calculations.
FIGURE 2. Graph showing average amounts (kg) eaten of forage dry matter by stag and hind red deer calves fed either silage or haylage and measured at different dates and showing relationship with changing daylength at Glensaugh. Note: forage is in addition to 0.85kg of concentrate dry matter fed separately.

<table>
<thead>
<tr>
<th>LWG KG/DAY</th>
<th>WEEK 0-8</th>
<th>WEEK 8-12</th>
<th>WEEK 1-18</th>
<th>WEEK 18-22</th>
<th>WEEK 22-26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27/10 - 21/12</td>
<td>22/12 - 18/01</td>
<td>12/01 - 29/02</td>
<td>01/03 - 18/03</td>
<td>29/03 - 24/04</td>
</tr>
<tr>
<td>Stags Silage</td>
<td>0.163</td>
<td>0.120</td>
<td>0.122</td>
<td>0.217</td>
<td>0.348</td>
</tr>
<tr>
<td>Stags Haylage</td>
<td>0.096</td>
<td>0.123</td>
<td>0.105</td>
<td>0.200</td>
<td>0.271</td>
</tr>
<tr>
<td>Hinds Silage</td>
<td>0.14</td>
<td>0.098</td>
<td>0.135</td>
<td>0.178</td>
<td>0.293</td>
</tr>
<tr>
<td>Hinds Haylage</td>
<td>0.080</td>
<td>0.078</td>
<td>0.083</td>
<td>0.165</td>
<td>0.133</td>
</tr>
</tbody>
</table>

TABLE 2. Average values for liveweight gain (LWG Kg/day) for stag and hind red deer calves fed silage or haylage from end-October 2015 to end-April 2016.

VARIATION IN PERFORMANCE:
The variation in starting and final liveweights is also shown in Table 1. Examples of differences between the heaviest and lightest stags for final liveweights were 15kg for silage and 33kg for haylage. Similarly, values for hinds were 13kg and 16kg for silage and haylage.
The question of such variation has importance in animal biology. Reasons may have a generic basis which affects growth, ability to eat, digest and utilise feed and to compete in a group feeding environment. Such variation suggests scope for improving performance by selection of higher merit animals in breeding programmes.

Other results, shown in the full report, established relationships which suggested that early fawning dates gave rise to the heaviest final liveweights. This suggests possible advantages in early conception in the previous Autumn and giving focus to reproduction in hinds.
EFFECTS OF DAYLENGTH:

The pattern of growth of the calves and liveweight gains, separated according to time periods throughout winter, are shown in Table 2 and Figure 1. The relationship between seasonal changes in daylength and estimated intakes of forage dry matter consumed by the deer (in addition to the 0.85kg/day of concentrate), are shown in Figure 2.

Average liveweight gains tended to reduce towards the winter solstice and decreased further or were maintained until late February after which there was marked recovery in all groups. Maximum gains of 348g/day were recorded for stags on the silage diet.

These results in growth are associated with the parallel reductions in intake of both silage and haylage in December and January and into February, from the greatest intake in early November. Intakes increased markedly in March and April.

The results suggest well-recognised reductions in feed intake and growth as daylength decreases and a delay into February of intake and growth in response to increasing daylength following the winter solstice.

It is noteworthy that long night conditions in North East Scotland may be an hour longer than in the south of England.

Of course, studies with additional lighting such as to a summer pattern of 16 hours light and 8 hours dark, have been shown to reduce the impact of short days in studies both at Glensaugh and at Rosemaund. This has been reported as an effective way of increasing production efficiency and works particularly well in reaching slaughter weight indoors by April or early May.

CONCLUSIONS:

The study demonstrated the potential for growth of stag and hind red deer calves in-wintered under natural daylength conditions in North East Scotland.

Both silage and haylage as forage along with a good quality concentrate supplement supported gains in liveweight to achieve in excess of 90kg for stags and 70kg for hinds by end of April. The heaviest liveweight were associated with the earliest birth dates.

Stags ate more and grew faster than hinds.

Considerable variation was evident in growth of individual deer, suggesting scope for selection, for breeding, from the best performing animals.

Growth performance on silage tended to be better than on haylage reflecting, on analysis, superior chemical and nutritional value and giving average benefits, although statistically non-significant, of 2.5kg (stags) to 1.3 (hinds) liveweight.

All groups responded to decreasing daylength by reducing forage intake and rates of liveweight gains (although all still gained weight), but with recovery of intake and growth rates after mid- to end-February.

The question of increasing lighting to overcome short day inappetence is considered.