GROWTH AND EFFICIENCY OF RED DEER STAGS

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The farming practice of deliberately feeding growing animals less than required for the maximum growth, in order to exploit rapid weight gain when the animals are again allowed free access to feed, has long been shown to be inefficient and wasteful. Although the "catch-up" or compensatory growth seems to be efficient, the energy costs of the previous period of slow or zero growth are never fully made up. The most efficient way to grow conventional domestic animals is as rapidly as possible, to a desirable slaughter weight. However, red deer, especially stags, show pronounced natural cycles of food intake and weight gain despite access to feeding to appetite.

Might it then be possible to manipulate the food availability of growing red deer stags such that the animals own seasonal pattern of "restriction- following-by-realimentation" be re-inforced? In other words, might the farming practice, shown to be anachronistic in sheep and cattle work for deer? To test this a study was carried out at the Rowett Institution on 12 young stags. These were collected in June 1977 on Fasque estate when a few days old and bottle fed at the Rowett. At weaning they were divided into two groups of six such that the average body weight of each group was the same, and placed indoors in individual pens. One group (Group A) was fed to appetite throughout the study and the other (Group B) was fed 70% as much as the average intake of Group A the previous week, from August 1977 until May 1978, and to appetite until September 1978. All stags were weighed weekly and food intake was recorded.

Group A stags grew well from weaning and despite showing a small check in May to June 1978 their increase in weight was almost linear between September 1977 and September 1978. The group B stags grew poorly or not at all during September 1977 until February 1978, slowly from February 1978 - May 1978, and remarkably quickly during compensatory growth in May - September 1978. Nevertheless in September at the end of this study they had failed to catch up on a Group A stags.

The average liveweight of the Group A stags in September was 112 kg; this compares very favourably with New Zealand conditions, where the target liveweight at 15 months of age is 107 kg. The Group B stags at 98 kgs were substantially larger than same aged wild Scottish deer but close to the weight attained by the best Scottish farmed deer.

For further analysis the liveweight has been divided into four periods. Period 1 would in the practical sense be the pre-weaning phase (assuming pre-rut weaning in September); Period 2 the harsh winter period with low or zero weight gains; Period 3 the spring with low weight gain and Period 4 summer with rapid weight gain. The actual weight gains are shown in Table 1 for comparison, expressed as g/day. The total metabolisable energy (that is the proportion of ingested energy available to the animal for growth) intake (ME) in megajoules (MJ) for each group during each period is given in Table 2. The exact value for Period 1 is unknown as the energy derived from milk was not measured in this study. Compensatory growth is clearly accompanied by increased energy intake. In total Group A consumed an average of 6242 MJ of ME from September 1977 - September 1978. During that time they gained 80.1 kg of liveweight, thus they required 78 MJ of ME per kg liveweight gained. Group B consumed only 5295 MJ of ME during this period, but

gained only 66.5 kg of liveweight. This works out at 79.6 MJ of ME per kg liveweight gained. It costs therefore an extra 1.7 MJ of ME to gain one kilogram of weight by following the same growth pathway as Group B. Clearly a less efficient system. If we assume a killing out percentage of 58% to convert liveweight to a skinned butchers' carcass then Group A produce 65 kg of saleable meat worth (at £1.50 per kg - a conservative figure) £97.50. Group B produce 56 kg of saleable meat worth £84 - a shortfall of £13.50.

The question now arises that if Group B's growth potential was reflected by the food availability on the farm, could the genetic potential be achieved economically by supplementary feeding? According to Dr P.F. Fennessy of Invermay a 50 kg red deer stag yearling requires to eat 37 MJ of ME above the energy it required to fulfil normal body functions in order to gain 1 kg liveweight. The shortfall in liveweight gain during Period 2 was 126 g/day and Period 3, 51 g/day. (Note the fact that growth rates of Group B were higher in Period 4 is irrelevant as it is desirable to eliminate the need for "catch-up" growth). Therefore in Period 2 each stag required to eat 0.126 x 37 = 4.7 MJ of ME per day extra and in Period 3, 1.9 MJ of ME per kg extra. Suppose the supplementary feed was whole barley providing 10.9 MJ of ME per kg fed. According to a January copy of Farmers Weekly this cost £105 per tonne ex farm. Each stag then required 64.7 kg of barley during Period 2 and 16.7 kg during Period 3 to attain their genetic potential growth rate. This supplementary feeding costs £8.44 per stag, giving a profit per stag of just over £5. If the supplementary feed was cheaper, assuming that it contains equivalent ME within the intake scope of the stag, these profits would be greater. Neither should over-fatness prove a problem. Indeed only 1.7% of all yearling stags in New Zealand are classed as fat and none as over-fat. Incidentally, it is worth pointing out that in this study some of the stags from each group were kept on the same feeding regimes for a further year. It cost Group A 663 MJ of ME per kg to gain a further 40 kg and Group B 1008 MJ of ME per kg to gain a further 23 kg. Clearly it is not energy efficient to kill stags at 27 months. Further from the New Zealand experience most of the Group A stags would be classed as over-fat and substantially down-graded accordingly.

To conclude I should like to point out that -

1. The fastest growth is the most efficient growth, for deer as for conventional livestock.

2. Supplementary feed can make up for any pasture shortfall in energy economically, to permit maximum weight gains.

3. It is inefficient to keep stags for slaughter until 27 months of age - 15 months is the optimum slaughter time for peak efficiency.

Table 1: Weight gain (g/day) for each group of stags during the first 15 months of the study.

PERIOD	1	2	3	4
GROUP A	253	256	194	202
GROUP B	234	130	143	284

Table 2: Total Metabolisable Energy (ME) Intake (MJ) for each group of stags during the first 15 months of this study

PERIOD	2	3	4
GROUP A	2176	1782	2284
GROUP B	1328	989	2978

Figure 1. The live weight of each group of stags during the study. The periods used to analyse growth rate are marked.

THE N.A.C. RED DEER UNIT - Progress Report 1982

This year's report from Stoneleigh makes interesting reading for a number of reasons. The conclusion begins "The Royal Agricultural Society of England after four years of study of the potential for Deer Farming in the lowlands has proved to its satisfaction that the management and husbandry of Red Deer is compatible with all other meat producers from grass - sheep and beef cattle" ... "The economics of Deer Farming are now such that with a good potential gross margin from retail meat sales, an opportunity is offered for a 'do-it-yourself' farming system."