Genetic Progress in Farmed Red Deer and Wapiti in New Zealand

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Cervus elaphus subspecies red deer and wapiti have been farmed in New Zealand for over 40 years, with the first deer farming license issued in 1970. As the industry moved beyond an establishment phase, selective breeding has occurred for traits that improve product quality and farming system profitability. Antler traits, velvet and hard antler weight and style were initially the production traits focussed on [1]. Being a highly heritable trait [2] which is measured during harvest, velvet antler allowed breeders to make good genetic progress without the aid of quantitative genetic tools. Liveweight traits were mostly selected from the mature sire and dam liveweights in the early years, as regular progeny data collection was not generally common practice. Liveweight traits only became a major focus in the last 20-years when quantitative tools for the estimation of breeding values became readily available to breeders [3]. Deer Select, the New Zealand deer industry performance recording system, has been providing estimated breeding values since 2005 [3, 4]. The majority of venison-focussed red deer and wapiti stud breeders’ record on Deer Select, whereas less than half of the antler-focussed stud breeders do. Deer Select measures a range of velvet, liveweight and carcass traits, conception success and date. It reports estimated breeding values (EBV) and multiple trait economic indexes [5] produced across-herds, but within breeds [4]. Over half, 15 red and 7 wapiti breeders, of the estimated 40 stud breeders in New Zealand record on Deer Select. This represents 2% of the national herd being recorded and satisfies >30% of replacement breeding sire requirements annually [4]. These recorded herds provide the opportunity to quantify the genetic progress, or genetic trends for the New Zealand farmed herd for any traits recorded since 1995 (Figs. 1 & 2). The industry has made genetic progress in red deer velvet antler weight both at 2-years of age and older over the past two decades, while it has really only been in the past 10-15 years that there has been genetic progress made on other traits. Growth traits in the past decade are making around 250% more genetic progress than during the previous decade (Figs. 1 & 2). These trends are averages across all herds recording on Deer Select, so some individual breeders are making much more dramatic genetic gains in antler, liveweight, reproductive and carcass traits, e.g. the EBV of the trait leading red sire for 12-month liveweight in 2005 was +14.9kg, whereas the current trait leader is +35.6kg. Gains have primarily been made by focussing on single-trait selection which can present risks long term, so now many breeders are adopting a more multiple-trait approach and/or using the economic indexes. This appears to be reflected in a slight reduction in liveweight EBV rates of gain (Figs 1 & 2). The genetic progress made since 1995 has added $8.60 per hind mated, to a red deer replacement early-kill venison system or $17.58 to a red deer terminal venison system [5]. Commercial producers who actively source the best improved genetics from stud breeders should be able to match the rates of genetic progress of their breeders to realise the gains for themselves. In many cases commercial producers are seeing much greater phenotypic gains above the estimated genetic gain, by improving their farm management, especially the nutrition of the animals.
Figure 1. Genetic trends for all red deer recorded on Deer Select from 1995-2016 for 12-month liveweight, 12-month carcass weight; 2-year-old, and mature (>2-year-old), velvet weight; estimated breeding values (EBV), all in kg.

Figure 2. Genetic trends for all wapiti and wapiti-red deer crossbreds recorded on Deer Select from 1995-2016 for 12-month liveweight, 12-month carcass weight; 2-year-old, and mature (>2-year-old), velvet weight; estimated breeding values (EBV), all in kg.

References