

ANTLER GROWTH is somewhat of a mystery to most deer farmers. The most commonly asked questions are why do they grow, what makes them branch, why do they re-grow annually, and, of course, why do they grow the size they do. This of course raises the question how can we make them grow bigger?

At Invermay over the last few years, although we have been concerned with all of these questions, it has been on the latter that we have concentrated.

Much of our research has centered around the accurate measurement of chemical substances in the blood of deer called hormones. These hormones act as chemical messengers; they are produced in one part of the body and travel in the blood to another part, where they have effect.

These hormones are present in minute quantities which change considerably hourly, daily, weekly and monthly. We believe that these changes in the amounts of hormone present control antler growth and may ultimately control antler size.

The hormone which largely controls the antler cycle is the male hormone, testosterone. At Invermay testosterone is measured accurately in blood samples taken very frequently from male deer. The samples must be taken frequently because the levels of this hormone may vary ten-fold from hour to hour.

We have found that male hormone levels are quite high when the stag first grows his pedicles but fall while he is growing his first antler.

Antler cleaning is due to a high level of male hormone. Casting of the old antlers in the spring is due to a very steep decline in this hormone; in fact, none can be detected in the blood at all at casting time.

During the first nine to 11 weeks of antler growth in the adult stag there is little or no male hormone in the deer's blood but sometime after velvetting, some is found. This leads to the mineralisation of the antler which is, of course, bad for velvet antler production. This increase in blood testosterone is probably a result of a decline in day length after the summer solstice. The male hormone level then increases until the antler is clean of velvet and rises even further



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Photo: Tim Wallis

What makes antlers grow?

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during the roar irrespective of whether the stag is used as a sire.

Information such as this tells us a lot about the way antlers grow and why they are replaced annually, but very little about how they grow and why they grow to the size they do. After all, there is no male hormone while antlers are being grown, so we measured the levels of other hormones which we thought might be related to antler growth. One of these is a hormone which resembles insulin. It is known as insulin-like growth factor or IGF and has been shown to stimulate bone growth in other animals.

We took blood samples from young stags before pedicle growth, during pedicle growth, during antler growth

and after antler cleaning. We found that the levels of this hormone were up to twice as high during antler growth as during any other part of the cycle.

In view of the fact that this hormone is known to stimulate growth of cartilage and bone we think that IGF could be one candidate for the "antler stimulating hormone". We do not know as yet the relationship between IGF and testosterone but we are studying this and its possible consequences at present.

So what could this result mean for the deer farmer? If we are correct in suggesting that IGF stimulates antler growth, then an increase in the level of IGF in the stag's blood during antler development, could mean bigger antlers? And also possibly bigger deer?

At present IGF is only available in very small quantities and it is likely to remain very expensive to produce, so it may not be possible to treat deer directly with it. However, IGF is only one hormone in a highly complex chain of events which controls a great deal of the body's functions. At present we are studying this chain and there may be two possible ways of altering this chain to cause an increase in IGF.

One is to administer a hormone which causes the release of IGF, thereby increasing the amount of IGF in the blood.

The other way is to block a hormone called somatostatin which indirectly prevents the release of IGF. We can do this in several ways but one way is to cause the animal's own immune system to raise antibodies to somatostatin - which is also what we are attempting. Another possible method is to manipulate the feeding or nutrition of the animal to increase the amount of IGF.

This work is only just beginning and we have many ideas stemming from our first set of data. Should we be successful then the deer farmer can look forward to larger antlers and larger deer. However, this may take some years to develop, and in the meantime selection of the highest velvet producers for breeding and a high level of feeding during winter and especially during the period of velvet antler growth are the best methods for producing high yields of velvet antler.