

# Tricks of the trade

## Melatonin and early breeding

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LIKE MANY domestic animals, Red deer are very seasonal. They breed in the autumn to give fawning the following spring and summer when, in the wild at least, food is at its most abundant — thus favouring the survival of offspring.

Photoperiod, or the length of daylight per 24 hours, is the annual environmental change most animals use to time their reproductive activity with the seasons of the year.

During darkness the pineal gland — located in the brain — secretes the hormone melatonin (its secretion is blocked by daylight). Therefore in summer when nights are short, melatonin is secreted for a short period only.

But as the nights get longer in autumn and winter, more and more melatonin is produced. This system, then, enables the animal to accurately entrain or match its reproductive system with the appropriate season of the year.

It is possible experimentally to trick animals that autumn and winter are approaching, by imposing "winter-like" photoperiods or melatonin secretion patterns. This has been achieved by locking animals in darkened rooms from 4 pm to 8 am or by administering melatonin by injection, with food or even in drinking water. While these methods work, they are not all that practical because of the 2-3 months of treatment required.

More practical methods have been developed in the last few years. Subcutaneous implants, designed to release melatonin slowly over a long period, have been developed and manufactured by Regulin Ltd in Australia, and used by research groups at Invermay, Lincoln, Massey and Ruakura. These Regulin implants are now licensed for use under veterinary supervision.

As the length of the daily photoperiod changes all year round, a deer is constantly able to adjust or coincide its annual body functions with the seasons. This means that the time melatonin is administered is important.

Before October and after January,



**Red hind with fawns**

*Breeding can be advanced with melatonin implants*

melatonin would have little use in advancing the breeding season in New Zealand deer. Preliminary results suggest that treatment beginning in late November-early December might be the most suitable.

So far treatments have been administered for 2-3 months (the implants last at least 30 days, so are replaced monthly) but it may be that a shorter duration is equally effective.

Treatment of hinds during pregnancy may upset lactation, while treatment of hinds with calves at foot will often be impractical. Therefore melatonin is likely to be most useful with stags and yearlings.

Melatonin-treated adult stags roared and herded their hinds more actively than untreated stags before the normal breeding season, whereas treated hinds conceived up to 3-4 weeks earlier than untreated animals.

So far, melatonin-treated deer have shown normal fertility. Interestingly, the use of a melatonin treated stag alone may advance the onset of the breeding season in untreated hinds.

Deer, along with most animals, also display seasonal cycles in characteristics such as antler growth, appetite and live weight and coat growth. Melatonin given to adult stags generally induced earlier casting, but the amount of velvet grown was unaffected. However there may be more regrowth after cutting.

Young growing hinds which normally display a phase of low growth in autumn did so earlier when treated with melatonin. However this may not be a disadvantage, particularly with treatments begun later in the season, as when growth resumed it did so earlier in treated hinds.

Melatonin treatment also induced an earlier summer coat moult and winter coat regrowth.

Treated stags do need special care. They are rutting earlier in the year, and so are more susceptible to heat stress. Therefore good shelter from the heat and a plentiful supply of water are very important. Running them separately from untreated stags will also help minimise fighting. □