

## Huge Potential of CARLA for all deer-farmers:

Parasitism is the biggest animal health issue for all deer farmers. The power of CARLA as a tool in worm management of our deer has taken on a whole new dimension. The outcome of the significant body of research that Jamie Ward and his team did in 2019 has been released and to say it is exciting would be an understatement. We are just at the start of the CARLA journey but the mind boggles as to where we could be in coming decades – will we need drench??

To briefly recap - a saliva test (CARLA) is the tool for determining the genetic basis for resistance to parasites in deer. The infective parasite for both lungworm and *Ostertagia* is the third larval stage (L3) on pasture. Once ingested they normally develop to adults and reproduce. The L3 larva has an external sheath which protects it (see picture). The sheath is shed after ingestion to allow the parasite to develop. Following ingestion and exposure to the L3 sheath deer develop antibodies in their saliva. These antibodies bind to the sheath which significantly affects the ability of the L3 to exsheath and develop further. The CARLA saliva test measures the level of this antibody.



### Key Facts

- CARLA is a heritable trait ( $h = 0.45$ )
- Deer with high CARLA levels have been shown to have lower numbers of adult *Ostertagia*.
- CARLA affords protection against both lungworm and gutworms (*Ostertagia*).
- Progeny of high-CARLA sires grow faster and are more profitable than progeny of low-CARLA sires.
- Young high-CARLA deer shed less eggs (gutworm) and larva (lungworm), thus reducing pasture contamination
- CARLAeBV was first developed in December 2016 and was incorporated into DeerSelect in 2018.

CARLA response was measured as part of the Deer Progeny Test. They found some promising results. Under moderately parasitized conditions, deer with a higher CARLA antibody response grew faster, showing a positive production response. Sires with high CARLA antibody response had progeny with high response; conversely sires with low CARLA response had progeny with low response, thus showing good heritability. All these indicate that selecting sires based on high CARLA results is an effective way to breed deer that can develop better natural immunity to gastrointestinal parasites.

As of 2020, there are about 8 Red and 8 Wapiti studs recording the CARLA trait and producing breeding values through DEERSelect. A real credit to Wapiti is the uptake of this technology by 100% of Wapiti breeders on DEERSelect. As this is a relatively recent trait, above average young males (sale animals) have breeding values greater than about +20, a high value would be greater than +50 and very high, greater than +100. As so many of our breed are used as terminal sires their influence in the industry is significant.

The trial carried in 2019 at Invermay gave a clear understanding of the relationship between CARLA and measures of parasite output in young deer. For each **3-fold increase** in CARLA, lungworm larval counts reduced by **~14% in April** and in **June by ~50%**. For FEC, counts were reduced by **~18% in April** and in **June by ~30%**. High CARLA deer grow faster and reach target weights sooner. **March-October liveweight gains increased by ~7% for males and ~4% for females for each 3-fold increase in June CARLA.**

### **Who can use CARLA?**

There are two avenues for the deer industry to capitalize on the CARLA technology:-

1. Commercial farmers can CARLA test their replacement females as rising yearlings (at 6 months or 10 months). The results will be raw data and not BVs. There are limitations with raw data - results are farm/herd specific and cannot be compared to other farms. The invaluable information is that the raw data will provide relativity within a herd. This will allow selection decisions to be made on replacements. This should be supported by purchasing sires with improved CARLA BVs to ensure on-going improvement.
2. Breeders can CARLA test their rising yearlings and those on DEERSelect will then get CARLAeBV's for their deer. The advantage of BVs is that they also account for non-genetic effects such as age, mob effects and other environmental effects. The CARLAeBV of an animal provides the genetic component of CARLA that an individual animal will pass on to its progeny and as such provides a powerful tool for farmers to use when selecting a sire.

### **CARLA testing is simple and cheap**

The optimal time to sample deer is either late Autumn at about 6 months of age (heritability 20%) or in Spring at around 10 months of age (heritability 45%). Once the CARLA antibody response has developed it will be maintained if animals are grazing pastures infected with parasite larvae. Cold conditions, feeding animals on crops or hot dry weather will lower exposure to larval challenge which in turn will reduce the CARLA response. Drenching does not affect the CARLA response as it is stimulated by incoming larvae picked up off pasture.

Saliva sampling to determine CARLA responses can be carried out by deer farmers using sampling kits provided by AgResearch. Everything is provided - instructions and materials. Saliva is collected by swabbing the cheek area of deer with a cotton swab. Use commonsense to clean forceps between animals to avoid cross-contamination .

Contact the CARLA Saliva test unit by E-mail: [Carlasalivatest@agresearch.co.nz](mailto:Carlasalivatest@agresearch.co.nz) or phone: 0800 422752  
Current cost is just \$10 per sample