Improving the success rate of AI and ET in Dorper Sheep using the DRAMIŃSKI Estrous Detector

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Summary

In this note we provide some preliminary results obtained from use of the Dramiński Estrous Detector and assess its potential as a means of improving the success rate in AI and ET of Dorper sheep.

Introduction

Like many breeders, here at Crestwood Dorpers, we frequently use Artificial Insemination (AI) and Embryo Transfer (ET) as a means to improve the genetic base of our stud flock. AI, and in particular ET, are relatively expensive processes and therefore it is highly desirable to maximise the success rate. To this end, we recently purchased an Estrous Detector (ED) made by Dramiński as shown in Figure 1.

Figure 1 – Dramiński Estrous Detector

The ED consists of a measurement probe, electronic unit and handle containing a standard 9 volt battery. The electronic unit is equipped with an LCD panel for reading measurements. At the end of the probe are two metal electrodes which enable the electrical resistance between them to be measured when in contact with a semi-conducting medium.

Studies on the properties of vaginal mucus in sheep (and many other animals) have established that the electrical resistance significantly drops during estrous. The ED takes advantage of this fact to enable the user to measure and monitor a ewe during her cycle. This is useful from a number of points of view which we shall discuss.

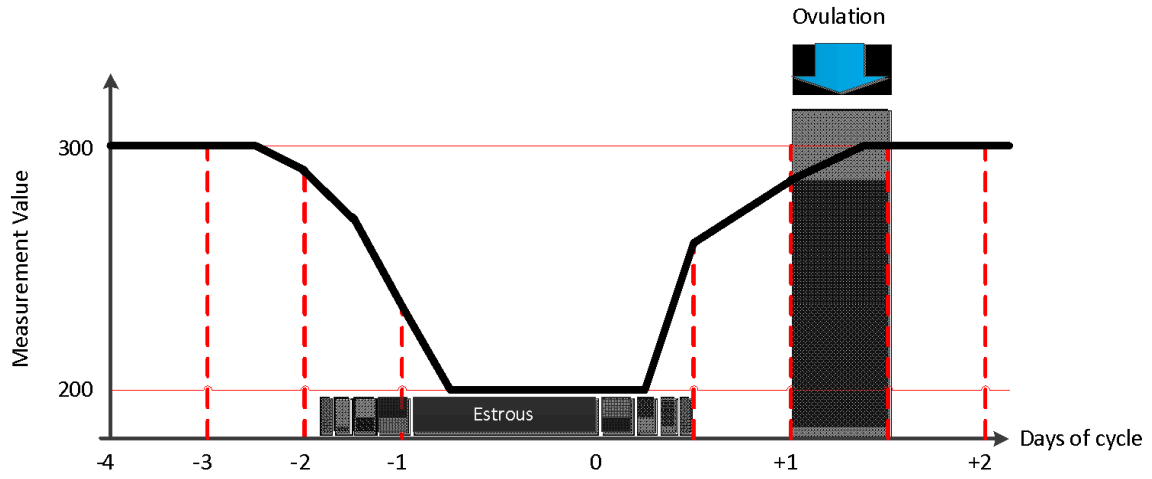

Figure 2 – Typical Ewe Cycle

Figure 2, taken from the Dramiński ED user manual, illustrates how the ED measured value changes through a ewe's cycle. Importantly, approximately 20 hrs after the measured value rises after Estrous, ovulation occurs. During this time period, as indicated by the shaded area in Figure 2, mating should occur.

If mating is successful, then repeating the measurements on the next cycle enables very early pregnancy detection. That is to say, the ewe is pregnant if there is no drop in resistance on the next cycle. This is considerably earlier than other forms of pregnancy test eg scanners.

Although early pregnancy testing will be of interest to some breeders, the ability to monitor a ewe's cycle in this way also has great potential to improve the success rate of AI and ET.

AI and ET

At Crestwood we have recently concluded a relatively small AI and ET program with Ovatec in which we used the Dramiński ED for the first time. The program used 45 ewes organised in three groups. The first group consisted of 21 ewes, from which 17 were needed to be recipients for frozen embryos that we had left over from one of last year's programs. The second and third group consisted of 12 stud ewes each. Each of these groups were to be AI'ed with a different ram.

As is the norm in such programs it is first necessary to synchronise the cycles of all ewes involved. In the case of the ET group however, there is a 6 day skew in the timing relative to the AI groups - since the embryos were harvested originally at day 6. In all cases, synchronisation is achieved by the insertion of Pfizer CIDR's for some time prior.

The critical timing sequence commences from the moment the CIDR's are removed. According to Pfizer, AI needs to occur between 47 and 55 hrs later. In other words, there is a specific 8 hour time slot in which insemination needs to occur.

A further timing constraint to consider is the fact that frozen semen was being used in our case. Frozen semen has an active period of about 6 hrs (which is significantly less than fresh or chilled semen). Consequently, it is necessary to ensure that the 6hr time window for the semen is located completely within the 8 hour window determined by the CIDR's.

Overlaying the CIDR induced and frozen semen timing constraints on top of the Dramiński typical ewe cycle chart for natural cycling we derived a modified version for AI, illustrated by Figure 3.

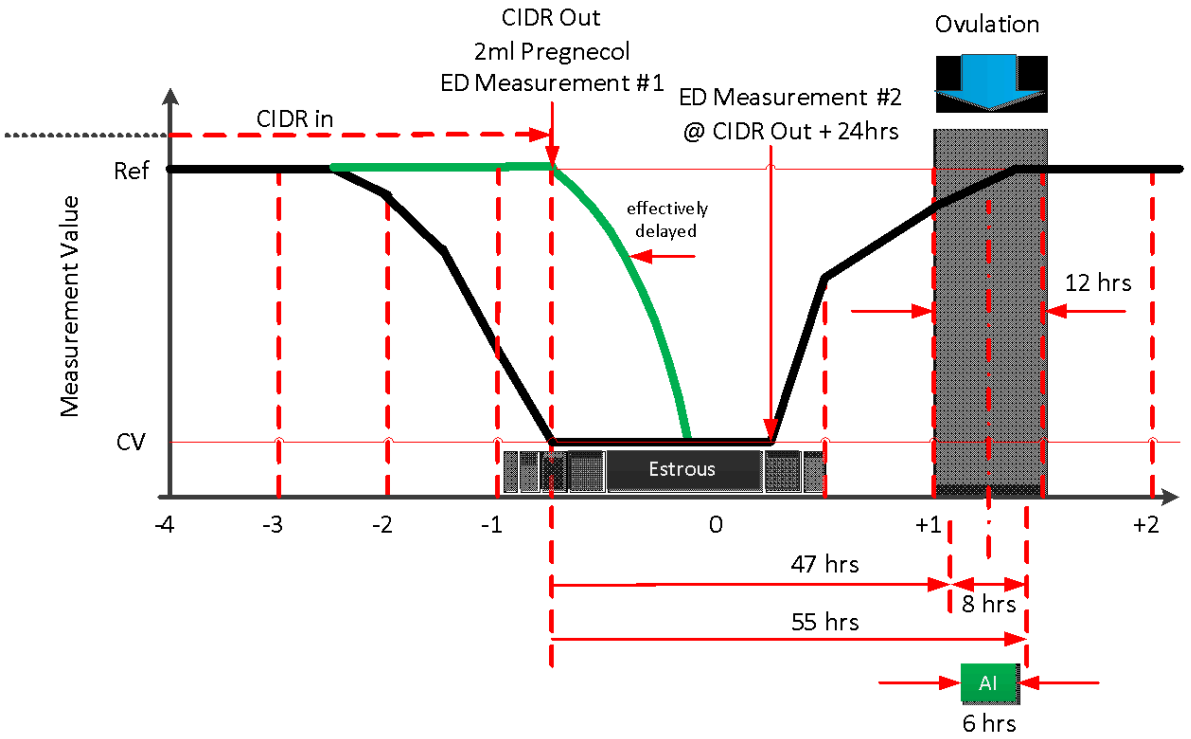

Figure 3 – Crestwood Modified Cycle for CIDR Synchronised Ewes

Consideration of Figure 3 reveals that in purely practical terms, the only absolute time one knows for certain is the time at which the CIDR is removed for a particular ewe. At this instant, the ewe is given an injection of Pregnecol and it is expected that the Estrous cycle will then start. Therefore, in order to align the CIDR time window of 8 hrs between 47 and 55 hrs later with the centre of the Dramiński ovulation window it must mean that the onset of Estrous is effectively delayed (or advanced) relative to the natural cycle. Similarly, it must mean that if the ewe is ovulating some 47 to 55 hrs later following the removal of the CIDR, the combination of CIDR and Pregnecol injection must 'compress' the natural cycle somehow. This hypothesis is purely a speculative as it is the only one that appears to fit the timings – perhaps Dramiński could advise?

Measurements

Again, from a purely practical point of view, we decided that whilst we had the ewes in yards to remove the CIDR's and inject them this would be a convenient time to make the first measurement with the ED. The value obtained for a particular ewe would provide a reference for subsequent measurements.

Unlike the value of 300 indicated on the Dramiński 'natural' ewe cycle chart of Figure 2, we found that the median value across all 45 of our Dorpers ewes was 430 at the point of CIDR removal.

Examination of Figure 3 reveals that a second measurement made some 23 to 24 hrs later should reveal if a ewe is cycling. Results from this measurement (which we termed 'confirmation value or CV') produced a median value (for those ewes that were cycling) of 280. A histogram of the two sets of measurement values is shown in Figure 4.

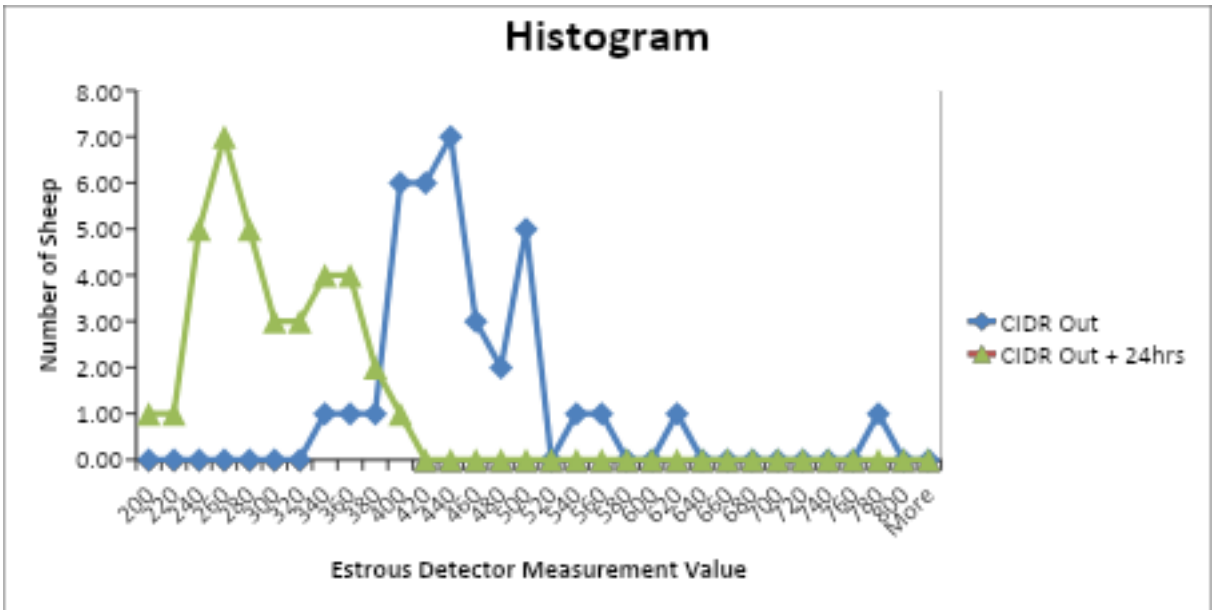

Figure 4 – Histogram of Measurement Results

It can be seen from Figure 4 that there was the occasional high value in the first measurement set. However, the second set of measurements had much less variance and the difference between the first for a particular ewe (if there is one) is very obvious. The median difference in value between the first and second measurement was found to be 150.

Interpretation and Use of Measurement Results

Of the 21 ewes that we had prepared as ET recipients, it turned out that one had lost her CIDR and a further five showed no difference between their first and second measurement. We took this to mean that they were not cycling and thus were eliminated from the program.

We found this to be a very interesting and valuable result. In the past, if we only achieved moderate success in an AI or ET program we never really considered that the problem could have occurred even before the vet came.

All our recipient ewes are well known to us and are proven mothers. We prepare them meticulously but just assume that when CIDR'ed they will be right to go at the appropriate time. The ED clearly told us that this is not the case. We would have spotted the missing CIDR in the one ewe but we would have just blindly picked 17 from 20 of the others to take the embryos. Had we done that, then potentially 5 of our 17 embryos would have been wasted.

With the additional information provided by ED measurement we used instead the 15 known good ones and implanted twins in two of them.

An important but often forgotten point in the AI/ET process is that CIDR's are not necessarily guaranteed to work. We are probably all guilty of having blind faith in them and look for other reasons to explain disappointing program results. According to Pfizer (in the small print on the CIDR packets), if a sheep has been stressed, ill or had poor nutrition they might fail to induce Estrous. With that said, we know that none of our sheep have been particularly stressed, ill or fed poor nutrition and yet we still had some failures. I guess Mother Nature rebels as well sometimes!

So, from our perspective, making two simple measurements using the ED in the ET context has clearly saved us money, time and improved productivity.

In terms of the AI groups, it turned out that all of our stud ewes were cycling according to the ED detector. A fact confirmed by our vet as he saw one or more follicles in his laparoscope as he AI'ed them. Had any of them not been cycling we would have similarly eliminated from the AI program beforehand and saved the effort and semen straw for another occasion.

Although we could have taken more measurements and attempted to refine the timing even further (particularly in determining the precise moment when the levels start to rise), taking the two that we have identified does appear to provide you with an immediate go/no-go answer on the suitability of a ewe for AI/ET which is by far the dominate factor. We can't wait to see how many are pregnant now but by all accounts it would seem that the Dramiński Estrous Detector has a key role to play in both AI and ET programs.

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