

Dorkness Mk 1 Centrifugal Camelid Poop Separator

Abstract:

The **Dorkness¹ Mk1** has been designed to provide a light and economical (*read cheap and flimsy*) solution for Camelid breeders who might wish to use a centrifuge² method to concentrate parasite eggs in fecal samples. Evaluation of the adequacy or otherwise of the Dorkness Mk 1 for any purpose whatsoever is left entirely to the judgement of the reader.

Introduction:

In the early months of 2006 intensive pursuit of parasitic worms, principally *haemonchus contortus*, in alpaca herds of the South Head area of the Kaipara Harbour, New Zealand created voluminous communications^{3 4 5} discussing *inter alia* procedures for detection and prevention of parasite infestations. (*Rademacher, Hull et al*) It was deemed that an enhancement to current local practice was required to provide greater precision in the detection of the eggs of *haemonchus contortus*. As a consequence Rademacher and one other acquired standard laboratory centrifuges imported from the USA as part of implementing enhanced parasite detection procedures on their respective farms. Moller⁶, being an interested observer of these activities was much impressed with the energy that was applied to the endeavour, and impressed the more so when it was arranged that Dr Hull should journey to New Zealand to present his seminars covering "*Life, The Universe and Everything*" as it relates to Alpacas⁷

During his Auckland seminar whilst discussing the issue of deploying centrifuges in parasite egg detection Dr Hull, acting on the basis of a chance remark⁸ made the previous day, called on Moller to identify himself to the assembled gathering. Hull then announced that Moller would shortly be building a cheap DIY centrifuge the design of which he would share with the alpaca community at large!

The challenge has been taken up from this ambush, with the device illustrated in figure 1 being constructed next day while Hull was in Napier delivering his seminar a second time. A copy of this image was despatched by email to him before the completion of his seminar.



Figure 1 The original prototype ready to run

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Method:

Establishing a proof of concept prototype involved much rooting around in the junk piles⁹ in the workshop at Lallybroch and further forays into farm sheds, cupboards and odd spaces under the house. In a period lasting about 4 hours it was determined that the available electric motors from various deceased washing machines, dishwashers, garbage disposals, vacuum cleaners etc each required significant effort to be mounted securely, connected to electrical supply and then to transfer in a controlled manner their rotational motive power to some form of spinning device. These assorted dilemmas were resolved with the discovery of an ageing electric drill that had been acquired in a trade-in purchase 25 years¹⁰ ago together with a collection of forgotten accessories that had been purchased some 10 years earlier still along with the drill that was traded-in.

From that point construction of a working prototype took about 20 minutes.

Components:

- 1 only B&D 3/8" capacity electric drill
the fascia plate states it's speed as 3000/2600 rpm – presumably this is a no-load speed and given the age of the unit it should be presumed that the lower figure may apply. It has an electrical switch that offers a lower speed that has been used for the centrifuge application. The speed of the centrifuge as built is estimated to lie in the 1500 to 1800 rpm range.
- 1 only lathe end turning kit comprising a horizontal bench mount to hold the body of the drill and a face plate that replaces the normal Jacobs type drill chuck when used in the lathe configuration – the face plate was not used in the original prototype
- 1 only 9" length of 2" x 1" dressed timber - this was only used in the initial prototype
- 1 only 9" length of 1 1/4" thickness plywood cut to a width of 1 1/2" - this was used as a replacement for the item above
- 1 only 3/8" x 3" coach screw – this was only required for the initial prototype
- 2 only wood screws with large heads 1/2" to 3/4" long – required only for the final version
- 2 only 15ml plastic sample tubes – diameter should taper slightly along their length.
- 1 B&D benchmate vise table – used for current temporary configuration.

NOTE: The pieces of wood used were simply workshop off-cuts so that the width and thickness dimensions shown are nominal only.

Construction and Configuration:

- Cut the wood beam to length
- Measure back from each end of the beam to mark the centre point from the two inclined holes that will hold sample tubes. It is important to measure from each end to get the best balance in the completed beam
- Drill one inclined hole at each end of the beam – for the sample tubes used a 5/8" spade drill bit provided suitable holes – inclined at a nominal 20 degrees¹¹
- Measure between the holes as drilled to determine a centre point for the beam axis. For the original prototype a 5/16" hole was drilled at this point to take the 3/8" coach screw which acted as the spindle for the rotating beam. For the final version this marked the centre-point for the face plate with the screws being used at points equidistant from the centre to attach the beam to the plate.

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- Mount the drill body into the bench mount unit and rig the assembly in the vise table so that the drill is held firmly in a vertical position
- In the original prototype the beam was mounted in the drill chuck using the coach screw spindle
- In the final version the Jacobs chuck was removed from the drill and the lathe face plate screwed onto the driving shaft in its place.

Figure 1 above shows the original prototype as assembled and ready to run

Figure 2 below shows a view of the assembled components for the final version ready for mounting vertically in the vise table

Figure 3 on a later page shows the final version of Dorkness Mk1 mounted up and ready to run



Figure 2 The final version assembled and ready to mount up in the vise table

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Operation and Evolution:

It is important to ensure that the beam is in balance before applying power to the motor. To this end ALWAYS ensure that there are sample tubes present in both ends of the beam AND that they are **BOTH SIMILARLY FILLED**. Failure to observe this rule may at the very least cause some astonishment to the operator! More dramatic scenarios should be guarded against also.

In practice the preparation time to take a fecal sample from the alpaca beams through to a correctly prepared and filled sample tube takes roughly the same time as doing a centrifuge run – ie 8 to 10 minutes. Thus it is often convenient to only attempt to spin one sample in each run. This has the advantage avoiding possible confusion of samples from two different animals if they were spun together. If working in this single sample manner then the other sample tube should be filled with water before attempting the run.

Caution: Professional laboratory centrifuges have their rotating parts, including the samples, enclosed within an “explosion container”. This provides a safety shield in the event of catastrophic failure among the rotating mechanical components. Please note that the DIY centrifuge mechanism described in this paper offers **NO FEATURES WHATSOEVER FOR GUARDING AGAINST THE CONSEQUENCES OF MECHANICAL FAILURES**. Any use of this device or similar derivative designs is at the sole discretion and responsibility of the operator of the device.^{12 13}

Running of the original prototype from the outset was satisfactory and relatively vibration free. It did become apparent however over a few runs that problems were quietly and gently¹⁴ developing and which might eventually overcome the entire arrangement.¹⁵

First up was the appearance of cracks along the longitudinal axis of the beam which were clearly going to lead to critical failure. The core problem was that a very old and dry piece of scrap wood had been used that simply wasn't up to the job. An off-cut from a very heavy piece of plywood that had been used in a furniture project proved to be a satisfactory substitute for the beam originally used.

Close inspection after progressively noisier runs a little later showed that the Jacobs chuck on the drill was gradually working loose from the drill shaft. As this chuck had previously resisted all attempts to dislodge it and remove it from the drill, this degradation was a welcome development. The way was now clear for using a configuration that eliminated the chuck in favour of the lathe faceplate. The resultant rig has since performed satisfactorily and uneventfully

The final working configuration can be seen illustrated in Figure 3 on the next page

A future evolution for the Dorkness Mk 1 may include

- A small pedestal rig will be built so that Dorkness Mk 1 can sit at floor level. This will incorporate a short vertical post (4" x 4") which the bench mount unit for the drill can be affixed to permanently
- A stack of three or possibly four old car tyres could then be placed around the whole rig to provide rudimentary explosion containment.

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Figure 3 Final version of Dorkness Mk 1 ready to run

Welcome to the Dorkness Mk 1 - The centrifuge for those who have more junk in their shed than they have money in the bank

Mike Moller, Lallybroch Alpacas, New Zealand

¹ The **Dorkness** name – The derivation of this name will be readily apparent to the denizens of the internet discussion group Alpacasite but for others here are a few words of explanation. A principal character in this story is Dr Steve Hull, PhD, a resident of Edmond, Oklahoma possessed of both academic and practical alpaca breeding expertise and widely respected for both. Steve, like all of us has his off moments and readily acknowledges his own goofs by referring to himself as Dr Dork; to his students, to his fellow alpaca breeders, to his friends and to anyone else who will listen..... stories about Dr Dork's great moments have become the stuff of legend to Alpacasiters. © During Steve's visit to New Zealand in February 2006 Ian Watt, an Alpacasiter well known in Australian Alpaca circles but latterly resident in Morro Bay, California, referred to Steve as His Dorkness, in a style of address evocative of Royal Visits to Her Majesty's Dominions downunder. It is presumed that Ian was reflecting the growing mood of republicanism in his former home country and has created the Dorkness order of chivalry in a way that precludes Steve taking the style of His Royal Dorkness! Whatever, it has offered this author an ideal name for the Heath Robinson/Rube Goldberg contraption that is the subject of this paper.

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² ref Evans - *Alpaca Field Manual* and elsewhere

³ Rademacher C and Hull S – semi private email exchanges 2005, 2006

⁴ Rademacher C, his friends and associates et al – shared email exchanges 2005, 2006

⁵ Rademacher C, Hull S, just about everyone, et al – proceedings of Alpacasite <http://groups.yahoo.com/group/Alpacasite/> 2005, 2006

⁶ Moller M and Moller G, proprietors of Lallybroch Alpacas www.lallybroch.co.nz

⁷ Hull S, - seminar notes *Alpacas – All Things Considered* presented February 2006 in Auckland and Napier, New Zealand

⁸ Moller, M – a casual remark made (foolishly?) during Dr Hull's visit to Lallybroch the day before his Auckland seminar to the effect “.. it might be possible to lash up a simple centrifuge from the junk lying around in my shed...”

⁹ Genuine kiwi blokes, and especially farmers, have a hallowed tradition of “rooting around the junk piles in my shed”. They regard their ability to fix, or make, anything from a piece of No 8 fencing wire as a national virtue. They borrow generously from technologies known as “She’ll be right” and “Sne’er enough”. All kiwi blokes have sheds. There is a well known C&W song to the effect that “every bloke needs a shed”. There have even been books about Blokes Shed’s. We have TV documentaries about them. There are web sites and blogs about sheds. Oh yes, I nearly forgot Aussie blokes have sheds too, but theirs aren’t nearly as good as ours

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¹⁰ Rademacher C – in a general announcement in the office of the Fletcher Industries computer centre “... have you guy’s seen that the Black and Decker distributor just round the corner has got a great trade-in sale going on? ...” – circa 1981

¹¹ The 20 degree angle has been the subject of some discussion. The basic theoretical position is that the forces applied on the sample in the centrifuge will be the same regardless of the angle of the sample tube. Separation will occur as long as the component of that centripetal force resolved along the line of the tube is significantly greater than the friction force opposing it. Under such conditions the heavier parts of the sample will slide towards the bottom of the tube. This situation is similar to the forces on a skier descending a piste or a mud slide in an ocean canyon. Either way the nominal 20 degree angle used in the Dorkness Mk1, mainly for the convenience of its construction, has proved to be sufficient. Other constructors are welcome to use a steeper angle but may need to reconsider the cross sectional dimensions of the beam in order to have structural strength sufficient to resist the g-forces imposed on the beam ends by the sample tubes.

¹² The responsibilities of the author of this paper are limited, at the sole author’s discretion, to the nomination for the next Darwin Awards (www.darwinawards.com) of whomsoever’s actions or carelessness lead to an accident occurring whilst using the Dorkness Mk1.

¹³ In the interests of safety the operation of the Dorkness Mk1 device at Lallybroch is carried out in an unoccupied workshop with the operator standing through a door in an adjoining space on a higher floor level. The power to the device is first “blipped on” for up to 15 seconds to check for imbalances in setting up after which it is switched on continuously for the duration of the run – about 8 to 10 minutes. The noise coming from the workshop during that time is monitored in case some unexpected vibration is indicated. It’s all a bit like the way radiologists pose you to receive their death rays and then take cover next door ☺

¹⁴ In the context of an ageing electric drill spinning erratically in a concrete floored workshop the description “quietly” and “gently” may not be totally applicable!

¹⁵ In British Commonwealth parlance such a device might be described as “Heath Robinson” In the USA it could be deemed a “Rube Goldberg Contraption”