

## It's Just My Opinion

What's really happening to the wombats on Moorunde?

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*"The Society wishes that a researcher was available to test the hypothesis that wombats are surviving due to exposure and selective adaptation to differing levels of toxins in their diet brought about by feeding on recently introduced weeds. This may not be genetic selection in the Darwinian sense, but rather as a result of epigenetics" (Clements, Collins, Taylor and Strauss – Natural History Journal, Sep-Oct edition 2015)*

Hopes that wombats (on Moorunde Wildlife Reserve) might survive from adapting to toxic weeds by re-arranging the theory of evolution to fit with wishful thinking are a poor foundation on which to manage a Wildlife Reserve that was set-up to protect this unique Australian animal. Currently the welfare of this Reserve (of 7,000 hectares) and the survival of the wombats on it, is dependent on the people who have made the above statement. Based on a conclusion that "...some members have observed not just unwell wombats, but significant numbers of apparently healthy wombats" (Clements, Collins, Taylor and Strauss 2015)

I remember about 45 years ago, during lectures on animal breeding and genetics, that the gene for horns in domesticated livestock such as sheep and cattle was a recessive gene. The gene for animals born without horns (known as "poll") is the dominant gene; and stock breeders have taken advantage of this fact. Because it's an obvious advantage for stockmen handling livestock, many breeds are now "poll". Yet for the original wild animals, that our domesticated stock have derived from, one would expect this to be the other way around. All wild cattle once had horns to defend themselves against predators, as they are not fleet of foot, like deer that run away as a defence. Why has such an obvious disadvantage been "built into" their genetic make-up?

This has some significance with wombats breeding on Moorunde too; because the "poll factor" is just one of many examples where genetics runs counter to intuitive expectations on evolution and "natural selection". Genes do not always favour the advantages to survival! In the case of

pre-domesticated wild cattle it's the pressures of external forces that select for survival. Poll animals just didn't survive to breed, despite the gene for poll being dominant.

The vast majority of wombats that become very noticeably ill, die shortly afterwards and do so underground, making discoveries of dead wombats on the surface (and therefore visible) a rare sight and animals sick enough to die an uncommon sight. So of course, "some members have observed...significant numbers of apparently healthy wombats". Being the only animals left to be seen. While research on neighbouring Brookfield's Conservation Park shows that every wombat (regardless of what it looks like) is in poor health (Lethbridge).

Over the past four years I have put in 4,800 hours running trials, surveys and conducting research on the Twelve Mile Plain section of Moorunde. This has involved travelling (either by foot or on a quad-cycle) over 3000 kilometres across the reserve. In all of that time and travel I have seen dozens of sick and suffering wombats, but only eleven that were **freshly** dead bodies (still intact) or so close to dying that I considered it necessary to put them down.

One of them was a male! The other ten females were with decaying embryo / foetuses in their pouches. So we need to question the idea of the wombats "Surviving due to exposure and selective adaptation to differing level of toxins in their diet...", "...as the result of epigenetics." Because for that hypothesis/theory to work it relies on the adult breeding animals staying alive long enough for the embryos to survive, grow and become independent adults.

Now, this is "just my opinion", but one would intuitively expect lactating females to be under more pressure during

"adverse conditions" than adult males. Hence it is likely that the breeding age female population has a much higher mortality rate; leading to a disproportionate ratio between the sexes. Another barrier to surviving "via epigenetics".

Over May and June of 2015 I inspected 100 warrens across the Twelve Mile Plain and detected the odour of decaying bodies in 63 of the warrens. Extrapolating from the estimated population of the Twelve Mile Plain, and the number of warrens, this figure conservatively indicates that 10-12% of the population could have died in that period. However..! If we take into account the ten out of eleven dead lactating females, it is possible that 20-25% of the female population has gone in that two month period of this year.

As can be seen in Figures 1a-e newly weaned wombats of either sex are at high risk and pressure for survival, at this stage of development and mortality would be equal between the sexes.

The native grass pasture density on Moorunde is only 0.00056 plants per square metre and hence so low it can be considered not existing. Consequently the wombats are entirely dependent on annual seasonal exotic weeds for survival. The year 2015 started off with great promise with 75% of the average yearly rainfall being delivered before the end of the first week in August. Then suddenly the rain stopped coming. This produced conditions favourable for exotic weeds in the first half of the year and unfavourable



Figure 1a: 22 November 2015



Figure 1b: 14 January 2016



Figure 1e: 23 January 2016



Figure 1c: 21 January 2016



Figure 1d: 21 January 2016

for them over the last half. All of the green feed drying up early in the spring. Meaning conditions for young wombats being weaned in spring were harsh; and many would not have survived simply for the lack of available grazing. Finding just one dead young wombat above ground is an indicator of this, but to find five ...!?

But what about the deaths during that wet half of the year? Figure 2 shows two

and baited for rabbits since 1994. As opposed to the 5,000 hectares of the Twelve Mile Plain, fenced from sheep in 2007 and baited for rabbits since 2008 - a significant difference!

The graphs illustrate the wombat population dropping during the drought year of 2008 and continuing to fall over 2009, as one would expect. But..! it also illustrates a dramatic drop in the

graphs comparing wombat populations from 2007 to the beginning of spring 2015 against the monthly rainfall over the same period. These graphs were reproduced from an article published in the September-October 2015 edition of the Natural History Journal by Glen Taylor and from his "Wombat Population Study". The study is conducted on two areas totalling 128 hectares on the original 2,000 hectares of Moorunde (where the dead young wombat was found in Figure 1a on 22 Nov 2015) these were fenced off from sheep in 1968

population AFTER THE EXCEPTIONALLY WET YEAR OF 2010 and during the very wet year of 2011!? Could this have been overlooked by the authors of the articles in the Sep-Oct 2015 Journal? "Glen Taylor, throughout the years on Moorunde, has observed fluctuations in the wombat populations as a result of rainfall, which translates to cycles of native grass" (Clements, Collins, Taylor and Strauss). But..! There is virtually no native grass on the reserve! "In an extended drought death rates are higher... In years of average and better rainfall the population gradually recovers" (Taylor 2014). There are conflicting claims by those authors here.

The wombats on Moorunde / Twelve Mile Plain Wildlife Reserve are now in a vice! Years ago they didn't necessarily die off dramatically during a drought. "It is of interest to note that a population increase occurred even in 1972, a year of rainfall only marginally above the recorded low of 1967..." [Taylor, 1977]. 1972 was a severe drought year! That was back when the kangaroo population was low enough to leave something for the wombats to eat. Now..! Now they die off because of droughts and are dying off during and after wet years (or wet seasons) when the exotic weeds have the potential to flourish. Why?

"Research by Amanda Camp has shown that, "...diets of wombats consist of... medic (52%)... thread iris (29%) and wards weed (13%)" (Clements, Collins, Taylor and Strauss, 2015). This research was using DNA testing of wombat droppings and done in a year and season when medic was unusually abundant. Which has been the case since 2010.

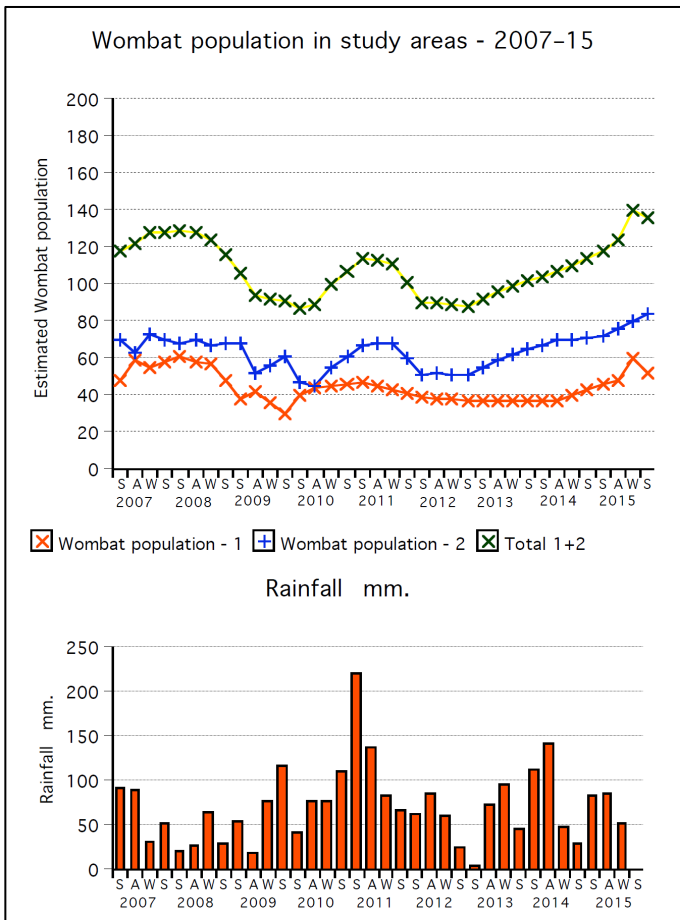


Figure 2: Natural History, Sep-Oct 2015, Glen Taylor

The medic referred to here is the annual plant; *Medicago denticulate*, commonly known as Burr Medic and related to the perennial medic commonly known in Australia as Lucerne and in USA as alfalfa (*Medicago sativa*). I mention Lucerne here because it is a popular component in many pelletised stock and pet foods; but I have seen rabbits dying from eating a steady diet of Lucerne hay. They had invaded and set up home in one of our stacks of baled Lucerne hay. Too much of this medic and they die from bladder and kidney disorders; and before doing so they become emaciated and lose most of their fur (there is something about that which resonates with me – see Figures 3a-b, starving emaciated wombats, humanely destroyed). Lucerne hay, or pellets high in Lucerne content, is not recommended for feeding captive wombats. Both of these medics contain high levels of protein and calcium and their leaves are low in fibre compared to the wombat's natural diet of native grasses that are low in nutrients and high in fibre and silicon.

Now, I'm not claiming that the medic component of the recent diet in wombats

have seen sick wombats on other properties (the ones where sheep are no longer run) that also don't have abundant native grass. Although one sees far less wombats during the day where there is good native grass because they rarely come out during the day in such locations anyway.

One other incidence that I have noted is that the difference between properties that do have both good native grass and still have sheep grazing on them is the fact that kangaroos are less abundant on the properties with sheep on them. Where the owners still allow "spot-light" shooters access, or possibly "spot-light" shoot themselves. In addition to this, sheep will favour and eat the medic first, leaving the native grass for the wombats. While the properties in the immediate district that no longer graze sheep are now owned by people who have bought them as "bush retreats", keep them as "sanctuaries" for wildlife and don't allow any shooting / hunting to take place on them. So the medic flourishes and so do the kangaroos. And...! Kangaroos prefer to eat the grass first and leave the medic unless that is the only plant left to them.

is responsible for this unusual high number of deaths during the relatively wet type of years/seasons when it grows. I'm just noting the coincidence! Also that wombats and kangaroos have, due to "natural selection", evolved to live on low nutrient, high fibre, high silicon content diets. And yes! I have also seen quite a number of less than healthy kangaroos with shabby coats too. I have also noted that on properties surrounding Moorunde that still have abundant spear-grass I have yet to see a sick wombat; while I

Just coincidences that I have noticed, I'm not even claiming it to be "my opinion"!

Before coming to live at Cambrai we had a small property at Mt Pleasant for six years where I ran 120 Corriedale ewes, with three Corriedale rams. Unfortunately the property I acquired this flock from went out of breeding Corriedales just after I bought them. Instead of travelling a totally impractical distance to obtain new rams I selected a number of ram lambs from my own flock each year to replace the old ones; and set out to see how long I could continue to maintain a genetically viable (self-contained) breeding flock from the 120 ewes. Within less than six years physical problems began to appear. Remember from the "poll" example, dominant genes are not necessarily those meant for long-term survival.

When we came to Cambrai (on the same area of land but half the rainfall) I had to reduce the number of breeding ewes from 120 to 45; an opportunity to cull out and select for the best bodied animals. Even so, within two years it was necessary to "quit" the whole flock. They were breeding "wrinkled breeches" and "devils grips" (which is a dip behind the shoulder-blades that tends to pool rain water and make them prone to body fly strike). While the wrinkled breeches meant that when the ewes urinated some of the urine was caught in the wrinkled skin; also making them prone to breech fly strike. In addition to this and after only eight years 70% to 80% of the yearly 'lamb drop' were males!

Now we take this lesson back and apply it to the wombats on Moorunde; and in particular the Twelve Mile Plain, as that has been the focus of my recent research over the past four years. Discounting whatever the number of wombats that died (in the good years) over 2011 and 2012, we will assume that there were approximately 2,000 animals over this 5,000 hectare area at the beginning of 2015. We will also assume the population still has (if it ever did) an even sex ratio. Although that is unlikely (St John & Saunders). Female wombats wean their young (and they mate again) when the joey is about one year old (Wells). It takes approximately two more years for them to mature (Wells).



Figure 3a: 11 February 2012



Figure 3b: 4 June 2015

So starting off, about half of these 2,000 animals (but probably more) would be mature and sub-adult males. Of the remaining 1,000 at least half would be sub-adult females not yet breeding. Which leaves at most only 500 breeding age females. With that (above) estimate 20%-25% mortality of breeding females, the current population of breeding females may now be as low as only 300 – 400! Only approximately 250 more than the ewes I started with at Mt Pleasant. Added to this the mortality of the weaned young animals this dry spring, about half of which would probably have been potential breeding females and it is reasonable to assume the number of potential breeding females is steadily falling. Even if the total number in the population remains at 2,000!

Now, I know I am probably erring on the alarmist side here; but I might not be! Even so if 120 ewes can only remain genetically viable for no more than ten years...!? How long can 300 female wombats last? Each of them still only

mate with one male; they can't mix their genes from several.

This leaves us to consider the possibility of an external "gene pool". The problem here, with Moorunde, is that it is now a 'sub-optimal' habitat for wombats. Meaning it is in such poor

condition that animals are leaving not entering. Although I can't prove this, I can provide an analogy (in reverse) to illustrate this factor is highly likely.

Figure 4a is a photo taken in March 1989 of the yard in front of our house shortly after we first arrived at Cambrai. Figure 4b is a picture taken in

December 1998 from the same location and in the same direction. Figure 4c is the same location again and taken just recently. What is illustrated here is (not just our garden) but a habitat for wildlife that is improving; and for this analogy it has become suitable enough to support a clan of White-browed Babbblers. When you include all four sides of the house and garden. 1998 was the first year that Babbblers appeared around the house. They were young birds looking for somewhere to stay and live; and some still had down protruding through their adult plumage. They didn't stay! Neither did the next clan the following year. Then in 2000 a clan of young birds did stay but they were unable to successfully breed and died out some years later. This happened two more times. Then in the late spring of 2012 a clan arrived (once again young birds) and once again stayed. They tried twice to breed in 2013 but failed; then on a second try in the spring of 2014 they were successful.

They have been successful twice since then, but on each occasion their own fledged young have been driven away.

You see even when a habitat is suitable for survival; it is not necessarily suitable for breeding. Regardless of how many numbers of a particular species that habitat may be able to carry. Also when a breeding habitat is at its maximum in terms of resources for that breeding population either young or some of the adults have to go elsewhere; and are forced to leave. While the "home" population then remains static and does not start to fall until the "new" population, animals being bred each year, drops below the home population mortality rate. If the animals / birds that leave can't find somewhere else suitable to breed in they can't and don't; and/ or if they don't find somewhere else suitable to survive in , they die!

The habitat for wombats on Moorunde Wildlife Reserve is in a state of decline. Because it has been overgrazed by a kangaroo population that exceeds between two and three times the number (in terms of grazing pressure) of "Dry Sheep Equivalents" to what it was pre 2007 when it did run (1,500) Weathers. This is what a "Dry Sheep" is. So it is in a perpetual state of being at its "breeding" limit; and each year that breeding limit is in decline. Even though the total number of wombats is (probably) still holding at around the same number. However what this means is that a varying and increasing number of animals would be forced to leave and they are taking their 'gene-pool' with them. Genetic variability is going out not coming in.

Wombats (in captivity) have been known to live over twenty years; and in the wild are renowned for their longevity (Wells)! So they can hold their numbers for quite some time at a very low breeding rate. Which gives the illusion that they can endure under adverse conditions; when in fact they may well be just holding onto a thread. Like the first Babbblers that came to our place and managed to stay but couldn't breed, they could (with a little more adversity) simply and suddenly all die out. Without any more warning than what we have already had; and how much more warning do we need? It's just my opinion but more trials into how to establish native grasses (when we already



Figure 4a: March 1989



Figure 4c: 7 December 2015



Figure 4b: December 1998

know how to do this) more research into what diseases or toxins there may be, more kangaroo counts and research into “epigenetics” isn’t going to save them.

***Population size is an important factor when assessing the ability of an animal population to adapt to long-term changes in the environment. It has been estimated that a minimum of between 50 and 500 pairs of animals breeding at random each year is required to maintain the genetic diversity needed to cope with environmental change (Tyndale – Biscoe & Calaby 1975, Frankel & Soule 1981, Kinner 1987). For the Hairy Nosed Wombat, a less frequent breeding success and the possibility of an uneven sex ratio between breeding individuals imply that 50-500 breeding pairs translates to a minimum population size of between 1,000 and 10,000 animals (B.J. St John & G.M. Saunders – PLAN OF MANAGEMENT FOR THE HAIRY NOSED WOMBAT IN SOUTH AUSTRALIA).***

The issue here is in the above words “to adapt to long term changes in the environment.” – as these changes have already occurred, and more rapidly than the authors of the “Plan of Management for the Hairy Nosed Wombat in South Australia” could have foreseen. The last serious drought in South Australia was in 1982 due not only to low rainfall that year but also to declining rain for the previous two years. Hence in 1982, “there were many bodies of dead wombats above ground” [Gaughwin MD, personal communication] this though would have only been a fraction of the total mortality. Perhaps no more than 20%, with the rest dying underground (personal estimate) the, “wombats have recovered in the past from large population declines” [Gaughwin MD, personal communication] and indeed they have! However..! In the past, after every serious drought (1967, 1972 and 1982)) two factors have to be taken into account: (1) the droughts decimated the rabbit population and (2) these droughts were followed by years of above average rainfall.

“1982 experienced severe drought conditions, but good rains came the following year . . . the summer of 1984/85 native grasses again created a fire hazard ...” [Taylor 1977].

This is the first change. As 1984/85 was the last time native grass, in abundance, has ever been seen on Moorunde - despite there being numerous years (in fact most years) since then having suitable rain for both germination and growth of native grasses.

The second change. That was 30 years ago and over that period the native grass seedbank in the soil has been depleted. So..! After the next serious drought there will not be a resurgence of native grasses for the wombat population to recover on. Just introduced weeds that they now also die from when they grow in abundance.

The third change. Since 1982 the kangaroo population in the district has dramatically increased: and they can, when pressed, forage on shrubs and bark [Wendt W, 2011, personal communications].

The fourth change. The wombats constantly digging for Thread Iris corms has damaged the soil so extensively that even if there was a seed bank present the grasses could not achieve significant recovery and trials provide substantial proof of this (own research). Even after three years the grass density in the 2.7 hectare Peter Collins Enclosure is only 0.114 plants / square metre. Not enough for a decimated wombat population to recover on.

This means the question we need to ask is what is going to happen to the wombats on Moorunde after the next severe drought or the one after next? Can they recover then?

The content of my letters and articles are of observations on which I form opinions, or on outcomes that can be substantiated from my own trials, experience or analysis; and where appropriate are, "backed up by advice...from University Ecologists and other Experts", that I have either consulted, learnt from attending lectures or studied from their published papers. While the Society has done no scientific trials (despite claiming to have done so) and have nothing in the way of results that can be backed up with any scientific method or data.

Common sense would tell almost anyone that what needs to be done is:

- 1) The kangaroo population on this (and other) reserves needs to be reduced.
- 2) The soil needs to be repaired to deal with the 'hard-pan' and rising salinity.
- 3) The invasion of tall shrubs has to be stopped and pushed back and
- 4) The native grasses have to be re-established. So that the wombats exist on a proper diet.

It's as straight forward as that! Except! It all has to happen in that order.

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