

Biochar Production in Manjimup

For some years a core group in Manjimup has been championing the agricultural use of biochar. During 2010 Warren Catchments Council hosted a number of presentations, one conveying information about wheat trials undertaken by DAFWA in the northern Wheatbelt that was showing promising results. This was in the era of the Carbon Farming Initiative when there was a carbon price and concern about developing carbon sequestration methodologies.

A local farmer, Doug Pow, contemplated a low-tech strategy to incorporate biochar into soils in our area where air seeders and similar machinery commonly used in broadacre farming is not economically feasible. He adapted an Austrian practice of improving soil fertility by feeding cattle trace minerals that they could deposit via their manure, on inaccessible steep slopes. Doug hypothesised that by feeding the biochar to cattle and utilising deep tunnelling dung beetles, stable carbon could be sequestered at virtually nil cost. He consulted Dr Bernard Doube, an internationally recognised dung beetle authority, to determine whether there were likely adverse impacts on the beetle at all stages of its life cycle. What was unknown was whether the beetle would bury char from the manure or leave it on the surface. Coupled with this query was a follow up the trial of German veterinarian, Achim Gerlach, whose research findings after feeding dairy cattle 300g/day of biochar (shedded environment) showed significant veterinary benefits to the livestock (reduced incidence of mastitis and lower somatic cell count, fewer digestion disorders, hoof problems, post-partum issues, increased butterfat content and improved fertility).

With the received advice, Doug commenced daily feeding biochar at a comparable rate to his beef cattle, mixed with a small amount of sweetener to train them to consume it on an ad-lib basis. The cows were duly trained and trained their calves, the beetles duly buried the manure – all of it.

Warren Catchments Council secured funding to hold two field days at Doug's farm throughout 2013 and applied for funding under the Federal Government's CFI (Action on the Ground in 2012 and Bridging the Research Gap in 2013) to replicate the practice on a larger scale. Bannister Downs Dairy was considered an ideal greenfield site: it had a dairy herd of 1000 and no winter-active dung beetles. The second CFI rejection came the last day a small State Government NRM grant was open, so the proposed study was pruned and with a quick cut and paste, submitted – success!

Running parallel to the Bannister Downs trial was a dung beetle survey by DAFWA, the result of which local farmers felt did not accurately represent the presence/absence of dung beetle species in the area. This prompted an application in late 2013 to South West Catchments Council to conduct a monitoring and distribution programme across WCC's area (eight sites from Boyup Brook to Walpole). This project, which concludes in 2017, has already generated significant data (a meeting in Bunbury last week with south-west stakeholders addressed the need to expand this project across the wider region).

Doug's continued use of biochar revealed unanticipated benefits: regular soil tests indicated continual increasing of levels of plant available nutrients and reduced acidity despite no additional fertiliser being applied. Clover began to dominate the pasture – the animals were thriving and stocking rate increased. Doug then tested whether feeding biochar to cattle during winter, instead of the common practice of feeding hay as a source of roughage, was effective. Eliminating the need to lock up pasture for hay production combined with the costs of fuel, labour, capital expenditure involved in making hay, demonstrated this is a way farmers could reduce their input costs and improve productivity.

Doug's activities have sparked interest and he has been invited to speak at several agricultural conferences. At one in NSW, he met Prof Stephen Joseph (UNSW and Nanjing University) who, as a lifelong biochar researcher, was intrigued. Complex analysis of soil samples discovered an amazing interaction between the biochar, clay and iron in the soil contributing to the nutrient availability. <http://ro.uow.edu.au/aiimpapers/1580/>

The growing interest in and awareness of the benefits of dung beetles and the word of mouth recounting of the soil fertility improvement through feeding biochar to livestock has stimulated adoption of this practice. As yet biochar is not an approved stockfeed, so cannot be sold as such. Comprehensive analysis of the Simcoa hardwood biochar, necessary for the Bannister Downs trial, satisfied DAFWA Animal Health that it did not pose a risk or threaten vendor declarations accuracy. Stockfeed companies have been approached to see if they were prepared to trial the incorporation of biochar in stockfeed pellets but the suggestion has not been pursued. This is disappointing as American company Cool Planet approached WCC, essentially to use their product in the trial so they could satisfy their regulatory requirements. This was resisted to enable local stockfeed producers to capitalise upon this new product – WCC's economic and legal naivety probably created lost opportunities.

Official trials and private adoption of the biochar-cattle-dung beetle practice have generated numerous lines of inquiry that need further research. The Biochar Forum WCC convened last November, drawing experts such as Prof Joseph, Dr Zakariah Solaiman (UWA), Dr Paul Blackwell (DAFWA), Euan Beamont (EFA), complemented by Doug Pow's contribution, outlined research findings and current practice production results across a wide range of agricultural applications – from broadacre to intensive horticulture, poultry to ruminant livestock rearing. Also, biochar's capacity to remediate saline affected land as has been demonstrated in a remarkable private trial, growing a bush tucker plantation in a salt-scalded property at Brookton.

A growing network of academics and farmers are enthusiastic about undertaking a wide range of research projects, examining how biochar can be incorporated – for its fertility enhancing, carbon sequestration or soil structure improving qualities. WCC is keen to enable this research that could increase the sustainable use of our natural resources (eg agricultural waste, sawmill by-products, redirected landfill organics, productive use of weed control debris and fire protection/forest residue materials) that will contribute to farmer increased productivity and potential new industry development (eg enhanced fertilisers production).