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作品名稱　**VERMICOMPOSTING-EFFICIENT DAIRY SLUDGE MANAGEMENT**

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VERMICOMPOSTING

The continued growth of dairy farming in NZ and the move toward keeping cows on stand-off pads has seen a major increase in two significant waste streams, the wood fibre that is scrapped off the surface of the standing pads and the effluent that is now concentrated at the site of these pads. In combination these waste streams offer the farmer an opportunity to recycle valuable nutrients back into the soil as an up-valued soil conditioner.

This investigation explores vermicomposting as a tool to efficiently manage these two significant waste streams. Sludge was removed from a settling pond and mixed with a range of carbon products that are recommended by Dairy NZ for use in stand-off pads: wood chips, post peeling, sawdust and also wood shavings (used in calf sheds). The wood fibre/sludge mixtures were assessed on their acceptability to tiger worms (*Eisenia fetida*) by measuring the pH of the mixture and seeing if they corresponded with the preferred pH for tiger worms. The vertical spatial distribution of tiger worms was measured over a period of 15 days and the rate at which the worms moved into the different mixtures was assessed. The worm mass before and after this 15 day period was also measured to ascertain the mixtures' ability to support worm growth. Finally, different ratios of sludge and post peelings removed from a calf shed were used in a choice chamber experiment to establish the worms' preference.

Tiger worms were used throughout the investigation as they represent the worm species most widely used in vermicomposting in New Zealand. Tiger worms feed on decomposing organic matter, bacteria and fungi in the upper organic horizon of soil.

All of the unused wood fibre and dairy sludge tested lay within the acceptable pH range for tiger worms. Wood fibre exposed to large amounts of urine *ie* calf shed post peelings, that lie outside the acceptable range can be favourably adjusted with the addition of dairy sludge.

All the particle sizes of the wood fibre tested were found to be acceptable to tiger worms and capable of supporting increase in their body mass beyond that of the compost. Due to the observation that the worms did not integrate themselves as fully in sawdust as the other fibres tested it is recommended that further investigation should be carried out before sawdust is used for vermicomposting.

While a comparison of the average worm density in each mixture may indicate a preference for post peelings this cannot be statistically proven and more trials are recommended. The preferred ratio within the limits that were tested is 1:3 calf shed post peelings to sludge (41% dry weight).

Vermicomposting can therefore be recommended as a possible onsite technology to process the twin waste streams of wood fibre and effluent generated by dairy farms. The next step would be to implement medium scale field trials with a continuous windrow system, testing resulting compost for its nutrient content and then comparing this output to that of current practises

【評語】120023

本作品貼近紐西蘭的實際情況，以 Tiger Worms 為主要觀察對象，討論其在本質纖維中的活動力，其中木質纖維的來源，分別為不同來源之木屑本作品之內容具創新性，並且思考邏輯性。