H10 Bone Fragmentation Created by a Mechanical Wood Chipper

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After attending this presentation, attendees will learn that dismemberment using a mechanical wood chipper quickly reduces bone to small fragments as well as the fact that despite fragmentation it is possible to segregate bone based on the type of woodchipper used.

This presentation will impact the forensic community and/or humanity by demonstrating the possibly of identifying the class of machine used to mechanically fragment bone.

A recent motion picture highlighted the use of a mechanical woodchipper in the disposal of human remains. Although body dismemberment using this means appears efficient, documented cases are rare. To determine the effect of a mechanical woodchipper on bone, a sample of 10 long bones of White Tailed Deer (*Odocoileus virginianus*) were processed through a commercially available 6.5 hp woodchipper/shredder. Modern wood chippers utilize two different rotating blades or hammers in reducing the size of vegetative matter. The chipper uses several short blades directly attached to a flywheel powered by a gasoline motor. The shredder component uses a single blade similar to that of a lawnmower attached to the motor shaft. For the particular unit used in this procedure, material processed by either the chipper or shredder is forced out a single opening using spring loaded flails mounted to a flywheel.

Five bones were processed through the chipper component and five were processed through the shredder component. After processing the bones were cleaned and dried. The dried bone fragments were weighed to the nearest gram. Mechanical sieves segregated the fragments by size. Three categories were created: larger than a size 5 sieve, between a size 5 and size 10 sieve, and smaller than a size 10 sieve. The segregated fragments were weighed and the percentage of the total dry weight was calculated. The mean weights for each category were compared by processing type. A t-test was significant at the .001 or higher that the means were significantly different for chipper vs. shredder.

The largest fragments (greater than a size 5 sieve) were further segregated into two subcategories, those with attached cancellous bone and those without attached cancellous bone. The percentage weight of cancellous attached bone fragments of the total fragment weight was calculated. Chipped bone and shredded bone displayed the lowest and highest weight percentage of cancellous attached bone at 28% and 73% respectively. A t-test was not significant that the means for cancellous attached fragments were different for chipper vs. shredder.

Comparing the two processing types found that the chipper reduced the bone to smaller, more uniform fragments (average of 39.8% vs. 73.4% of total weight greater than a size 5 sieve). Some shredded fragments exceeded 38 mm in length and were identifiable as to bone type (i.e., humerus). The size of these fragments was such that further analysis was still possible. Chipped fragments rarely exceed 12 mm in length.

The most useful criteria in determining what form of wood chipper/shredder was used are: 1) fragment size segregation, 2) identifiable fragments as to bone type. Both methods are predicated on complete or near complete recovery of fragments. Any loss of fragments will alter the prediction of wood chipper type.

Bone Trauma, Woodchipper, Dismemberment

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