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DETERMINATION OF THE HIGHEST DNA YIELD FROM DIFFERENT BONE TYPES THROUGH DNA EXTRACTION FROM PORCINE REMAINS

Jeremy Simmons

Abstract

DNA extraction is a common method used to identify unknown victims of various circumstances including natural disasters, homicides, and other forensic related events. The methodology to carry out these procedures are well defined and have continued to be expanded throughout the years. Contrarily, specification in terms of specific bones that yield the highest DNA yield has been contested. Higher yields of DNA provide more efficient ways to conduct further analysis for victim identification, thus making sample selection a great priority.

To examine this relationship, four bone types including long short, flat, and irregular bones from pigs underwent DNA extraction to determine if there was a difference and if so, which type yielded the highest DNA yield. Included in this study to represent these four bone types were nine bones including two femora, two patellae, two ribs, two thoracic vertebrae and one calcaneus. By preparing the sample through a warm soak of a detergent-sodium carbonate solution, the bones were able to be smashed for decalcification. After the lysis stage, DNA was extracted from nine bones using the QIAamp DNA Investigator Kit and quantified using the PowerTrack ™ SYBR ™ Green Master Mix and Roche 480 LightCycler.

Results indicated that the highest performing bone sample was the rib (0.915 ng of DNA/µL), although the second rib sample did not yield quantifiable DNA. The second highest was the thoracic vertebrae (0.551 ng/µL on average for the two samples). This outcome suggests smaller bones could yield higher DNA, in contrast with previous literature pointing to long bones with thick cortical bone having the greatest DNA yield. Further research is necessary to define these bone types and discern entities such as quality and STR typing to validate and implement this in forensic genetic casework.