

Application of machine vision to determine the density of Dingo teeth

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To devise effective management strategies for animals in the wild and to examine their ecology, it is often useful to determine their age. For determining of the age of dingoes, methods are usually associated with measurements of the diameter of tooth pulp cavity. However, this approach is complicated in animals older than two years by closure of this cavity. Tooth density has recently been examined as a means of aging dingoes (Ellerton et al: in prep). To avoid the need for immersion of the porous tooth to use the Archimedes method, we present a method to determine tooth density through the application of machine vision technology.

A canine tooth removed from a dingo skull of known age was mounted on a rotating vertical shaft, driven by a stepper motor controlled by a computer. Using a web camera, the computer can capture images of the tooth against a black background as the tooth rotates about the vertical axis. Active-X software was developed for analyzing images using some principles common to those used in tomography. Analysis using the green component of the image data resulted in a clear black and white silhouette of the tooth. Fifty images were captured per rotation of the tooth. These were used to compute volumes of 320 notional slices to calculate tooth volume in cubic pixels. Calibration of the system with a marble of known diameter enabled tooth volume to be expressed in mm³. Tooth density was calculated by dividing tooth mass by tooth volume.