

A COMPARISON OF NON-INVASIVE TECHNIQUES FOR ESTIMATING TOTAL BODY FAT IN SHARP-SHINNED AND COOPER'S HAWKS

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Abstract

We evaluated the use of three direct methods (fat scoring, condition indices, and multiple regression of external morphological variables) to estimate total body fat (TBF) in Sharp-shinned Hawks (*Accipiter striatus*) and Cooper's Hawks (*A. cooperii*). All three methods explained more than 82% of the variation in actual TBF values, and all three methods required the use of multiple equations to account for the categories of species, age, and/or sex. We also evaluated an indirect method that estimates TBF by the difference between actual mass and estimated lean mass. We estimated lean mass using a multiple regression of external morphology variables, and this technique was also fairly accurate ($r = 0.94$). The methods evaluated here, though reasonably precise, may not be accurate enough to reliably compare estimated TBF between individual birds. Using multiple regression to directly estimate TBF from mass and tarsus length measurements is the recommended technique because (1) it provides continuous estimates of TBF (2) it requires measuring only two external morphology characters, both of which are less subjective than fat scores, and (3) it is more explanatory than the other two methods which use external characteristics as predictors. Our results also suggest that comparing groups of birds using condition indices may yield misleading results because these indices can relate to TBF differently for species, age, and or sex classes.