Live Weight Estimation of Donkeys in Central Mexico from Measurement of Thoracic Circumference

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ABSTRACT

Body measurements (length from nape of neck to the withers; height to withers; length from withers to tail root; length from shoulder to tuber ischii; thoracic circumference; umbilical circumference) were taken and correlated with live weight from 160 donkeys (mean ± standard deviation = 6 ± 2.6 years old) in Central Mexico. The age was assessed from dentition. Sex of the donkeys was also recorded. Sex was an important factor of variation (p = 0.011). Live weight was estimated using two allometric models. Model 1: Live weight = β0 × (thoracic circumference)β1. Model 2: Live weight = β0 × (height to the withers)β2 × (thoracic circumference)β3. Separate prediction equations were produced for males and females, plus one for the total sampled. The ‘best fit’ models, were those using thoracic circumference to predict the live weight. Males: live weight = 0.018576 × (thoracic circumference)1.38410 (R² = 0.9839). Females: live weight = 0.031255 × (thoracic circumference)0.72868 (R² = 0.9839). The equations derived to estimate the live weight of donkeys in Britain, Morocco and Zimbabwe were less satisfactory for use with donkeys from Central Mexico because they overestimated the live weight.

Keywords: allometry, donkey, live weight prediction, Mexico

Abbreviations: β0, 1, 2- parameters in the allometric model; R, correlation coefficient

INTRODUCTION

In order to administer medicines or to anaesthetize an animal, a veterinary surgeon must know the weight of the patient, given that most manufacturers’ instructions prescribe dosage according to body weight. For the small-animal practitioner this does not represent a problem, as scales are available in their clinics. For large animals, horses in particular, weight is calculated using mathematical equations or is estimated according to experience, this latter resulting frequently in incorrect dosage.

The programme ‘Donkey Sanctuary, Overseas – International League for the Protection of Horses – Universidad Nacional Autónoma de México (DS-ILPH-UNAM) operates from the School of Veterinary Medicine and Zootecnis of the
National Autonomous University of México (Aluja and Lopez, 1992). Among its objectives are deworming programmes for equids (horses, mules and donkeys). In the case of the first two species, equations are available for calculating the live weight of the animals (Carroll and Huntington, 1988) in order to be able to administer the correct dosage; in the case of the donkey, no such formula exists in México. The Mexican donkey is in general neglected and abused (Aluja and Lopez, 1992). Generations of poor nutrition have resulted in a smaller and lighter animal than in donkey populations found in other countries.

Three equations have previously been developed to estimate live weight from body measurements in donkeys, one that used measurements of donkeys in Britain to estimate live weight and the others using working donkeys in Morocco (Pearson and Ouassat, 1996) and Zimbabwe (Nengomasha et al., 1999). The donkeys that Eley and French (1993) worked with in Britain to establish their allometric formula were non-working and mostly overweight. The Moroccan and Zimbabwean donkeys, although used for work in Africa, are likely to have different conformation from those found in México. Use of these equations to calculate the weight of the Mexican donkey could be inaccurate, and therefore dangerous, when it is necessary to calculate exact amounts of anaesthetics or other substances that require precise dosage. A study was undertaken to develop a more accurate formula that could easily be applied by a veterinarian or a donkey owner to calculate the weight of an individual donkey in Mexico.

MATERIALS AND METHODS

*Animals and measurements*

One hundred and sixty donkeys of both sexes from Central Mexico were measured. These donkeys were owned by local farmers who used them to bring their goods to the weekly markets. The donkeys were weighed standing on a portable weigh-scale. The following body measurements were taken (Figure 1): length from nape of the neck to the withers (measured with head in normal position); height at the withers (using a measuring stick with the donkey standing squarely on level ground and with its head so that the eye level was above the withers); length from withers to tail root (measured with a non-stretch stock-measuring tape with the donkey standing as for the height measurement); the length from the shoulder to the *tuber ischiī* (taken with a measuring stick); thoracic circumference (measured from behind the front legs round the caudal edge of the withers) after an inspiration of breath; and the umbilical circumference (measured over the remnant of the umbilicus). The age (from an assessment of the incisors) and sex of the donkeys were also recorded. Weight was recorded to the nearest kilogram. The animals were marked with an indelible pen when they had been measured to prevent them being recorded a second time.