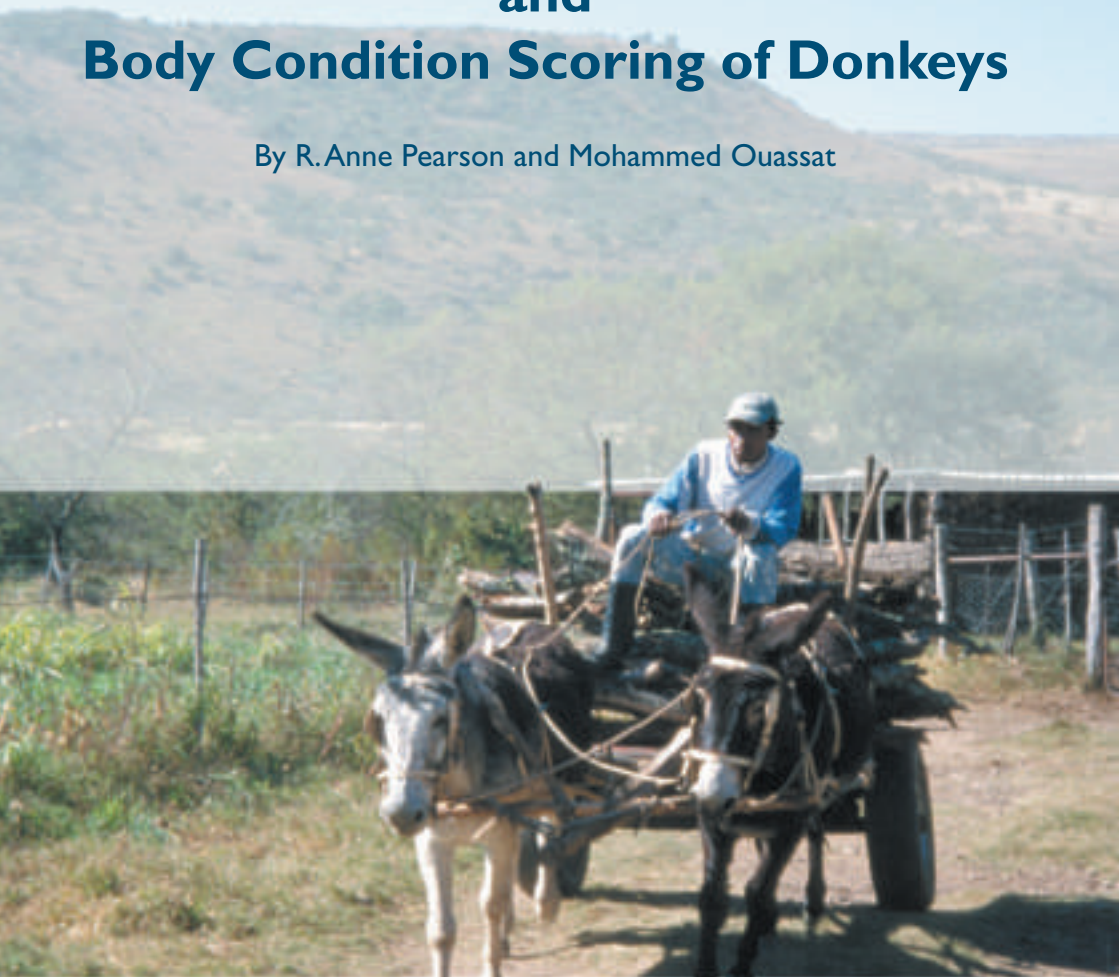


A Guide to Live Weight Estimation and Body Condition Scoring of Donkeys

By R. Anne Pearson and Mohammed Ouassat



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A GUIDE TO LIVE WEIGHT ESTIMATION AND BODY CONDITION SCORING OF DONKEYS

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Front cover: Donkeys in South Africa

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Introduction

Donkeys originate from the semi-arid parts of the world, but are now kept in a variety of different environments, although they are rarely found in the humid tropics.

Obesity (overweight) is the biggest problem facing donkeys kept in temperate areas of the world where food is relatively abundant, and of good quality. These donkeys do relatively little work, often being kept as companion animals. Emaciation (underweight) is the biggest problem facing donkeys kept in the hotter tropical areas where food is in short supply, and of poor quality for many months of the year. These donkeys often work for at least part of each day in transport or tillage activities. Donkeys working in urban areas, where there is less opportunity for grazing, can be more at risk of malnutrition than those working in rural areas.

In places where donkeys are used for work, good management generally involves trying to ensure the animals eat enough to meet their daily requirements for food. This can be difficult where there are large seasonal fluctuations in the quantity and quality of forage available. Often there are also seasonal variations in the type and amount of work the donkeys are expected to do. Failure to eat enough food to meet the requirements for maintenance, work and production mean that the animal will lose body weight and condition. Good donkey owners/users should be aware of changes in the weight and condition of their animals and be able to adjust the amount of food given, or work that the animal is doing, to prevent emaciation at one extreme or obesity at the other. Weight loss can also occur when an animal is sick, heat stressed or short of water, since all of these can affect appetite, hence it is useful to be able to quantify the changes in weight and condition of a donkey even if it is not used for work. This booklet is a guide to two easy techniques, which can be used to assess the extent to which work, nutrition, disease, management or other environmental factors affect the donkey.

1. Assessment of body condition

Body condition is a useful indicator of a donkey's nutritional status and its well-being. There are disadvantages in relying on live weight measurement alone. For example, measuring average live weight in a group of animals many not show their nutritional status. An animal with a small frame in fat condition can be the same weight as a large framed animal in thin condition. If only live weight is recorded animals need to be individually identified to record any changes in body reserves over time. However, even this may not accurately show changes in body reserves. This is because actual live weight of a donkey will depend not only on the amount of body protein and fat, but also on gut-fill, hydration and stage of pregnancy. Condition scoring can be done quickly, cheaply and easily with minimal handling of donkeys. It can be used to compare donkeys of different sizes and on different management systems where individuals cannot be reliably identified. Although condition scoring is a subjective technique, with practice, people doing it can obtain a high level of repeatability on different occasions and between different scorers.

2. Assessment of live weight

Although average live weight may not always be a reliable indicator of nutritional status for a group of donkeys, it can be used when monitoring individual animals over time. This is provided efforts are made to reduce the effects of gut-fill and hydration, for example, weighing the animal at the same time of day each time it is weighed. Live weight is also important in calculating the correct dosages of drugs when treating a donkey and to determine the load carrying capacity and draught work capacity, so as to avoid overloading and

overworking. Weighing scales are the best method of determining the weight of any animal. Unfortunately, weighing scales are seldom available where donkeys are kept for work. The estimation of live weight from body measurements is a 'portable' technique, which can be used at markets or on farms. It provides a simple, cheap alternative to direct weighing. The disadvantages of this method are that it requires handling of the donkey and body measurements can sometimes vary depending on how straight the donkey is standing, hair cover and tension of the tape.

Neither of the techniques of live weight estimation or body condition scoring is new. For over a century, linear body measurements have been used in mathematical equations to estimate the live weight of cattle in the absence of weighing scales, and separate body scoring systems are available for dairy and beef cattle (both *Bos indicus* and *Bos taurus*) and different breeds of sheep. Similar techniques are required for donkeys to help in their husbandry and management, particularly for those working animals found in areas where food is difficult to obtain.

To develop the techniques a large number of donkeys needed to be studied. This was achieved mainly by visiting souks around Rabat, Settat, Khemisset and Tifelt in Morocco where large numbers of donkeys are used to transport goods to and from the souks on market days. A detailed description of the main activities and results which led to the development of this guide has been published (Pearson and Ouassat, 1996).

Body Condition Scoring System

The method described in this booklet has been modelled on the nine-point system developed for zebu cattle by Nicholson and Butterworth (1985). A nine-point system was selected as it gives distinguishable steps that can be described and used to account for the wide range of body conditions that are shown by donkeys around the world from temperate to tropical areas. It avoids the use of half-points, which seem to be common when applying a five-point system to livestock condition scoring. An arrangement in which three main categories are first defined, which are then each sub-divided into three to give nine possible options gave repeatable results as well as being easy to teach and explain to others. Units of three worked well where subjective assessment was required. There is always 'one unit at each end and one in the middle', making decisions easier.

The scoring system prototype was developed and tested in the study of 500 working animals in Morocco and 60 sedentary animals in the temperate area of South East Scotland. All animals were over 4 years of age. Extension workers and farmers keeping donkeys in the Addis Ababa and Shewa areas of Ethiopia tested the prototype. Minor modifications were then made and the system finalised.

Tips on how to use the condition score system are given on page 14.

Illustrations of Body Condition

Body Condition Score 1 - Very Thin



Very thin (Emaciated)

Animal markedly emaciated; bone structure easily seen over body; little muscle present; animal weak, lethargic.



Body Condition Score 2 - Thin**Thin**

Animal emaciated: individual spinous processes, ribs, hooks (tuber coxae), pins (tuber ischii), shoulder blades and spine all prominent, sharply defined; some muscle development; neck thin; prominent withers; shoulders sharply angular.

Body Condition Score 3 - Less Thin**Less thin**

Vertebral column prominent and individual spinous processes can be felt; little fat, but superspinous muscle over spinous processes apparent; ribs, pins, (tuber ischii) and hooks (tuber coxae) prominent; loin area and rump concave; little muscle or fat covering over withers and shoulders.



Body Condition Score 4 - Less Than Moderate

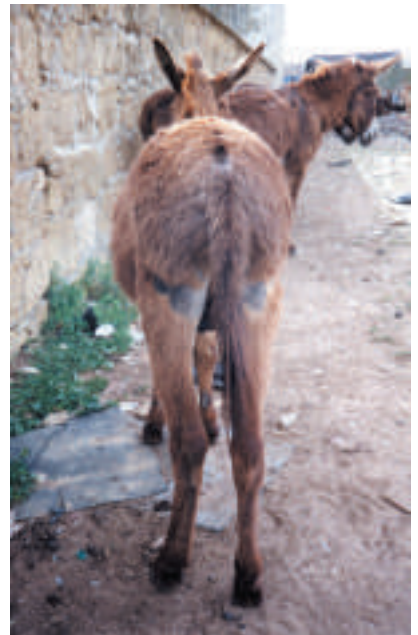


Less than moderate

Vertebral column visible; pins (tuber ischii) can be felt but not visible; hooks (tuber coxae) rounded but visible; rump flat rather than concave; ribs can be felt but not obvious; withers, shoulders and neck have some muscle and fat cover; shoulder blades less clearly defined.

Body Condition Score 5 - Moderate**Moderate**

Superspinous muscles developed and readily apparent; vertebral column can be felt; hooks (tuber coxae) rounded; rump rounded, convex; pins (tuber ischii) not visible; some fat can be felt in shoulder area region and at base of neck; can feel ribs, but not visible.

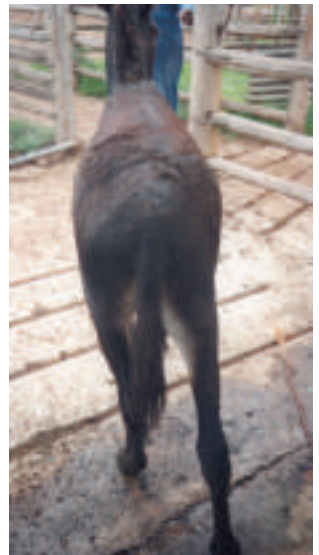


Body Condition Score 6 - More than Moderate**More than moderate**

Cannot feel spinous processes easily; back becoming flat well covered; rump convex and well muscled; some fat can be felt on neck, base of neck and shoulder area; neck filled into shoulder; hooks (tuber coxae) just visible.

Body Condition Score 7 - Less Fat**Less fat**

Back flat; cannot feel spinous processes; hooks (tuber coxae) just visible; fat on neck and shoulder area beginning to expand over ribs; flanks filling, neck thickening.



Body Condition Score 8 - Fat

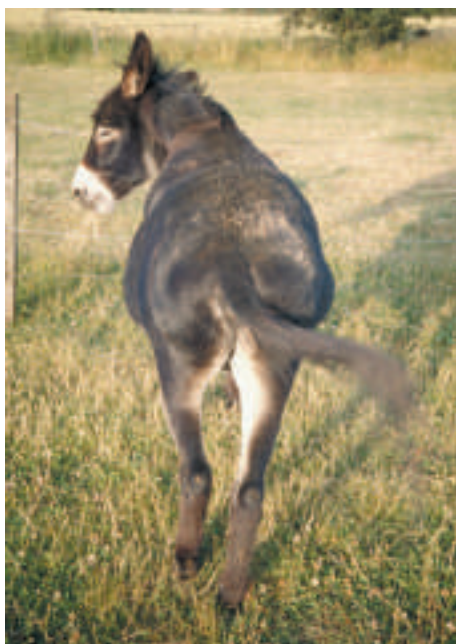


Fat

Animal appears well covered with body rounded with fat and bones not discernible; flanks filled, broad back.

Body Condition Score 9 - Very Fat**Very fat (obese)**

Bones buried in fat; back broad or flat, in some cases crease along the backbone; large accumulations of fat on neck, over shoulder area and ribs; flank filled with fat.



Tips on how to use the condition score system

Some forward planning can help make the task easier. The first step is to make sure that the donkey is standing quietly with enough space for you to be able to walk around and handle it and without it being distracted by others. It should be standing in a well-lit area so you can see it clearly.

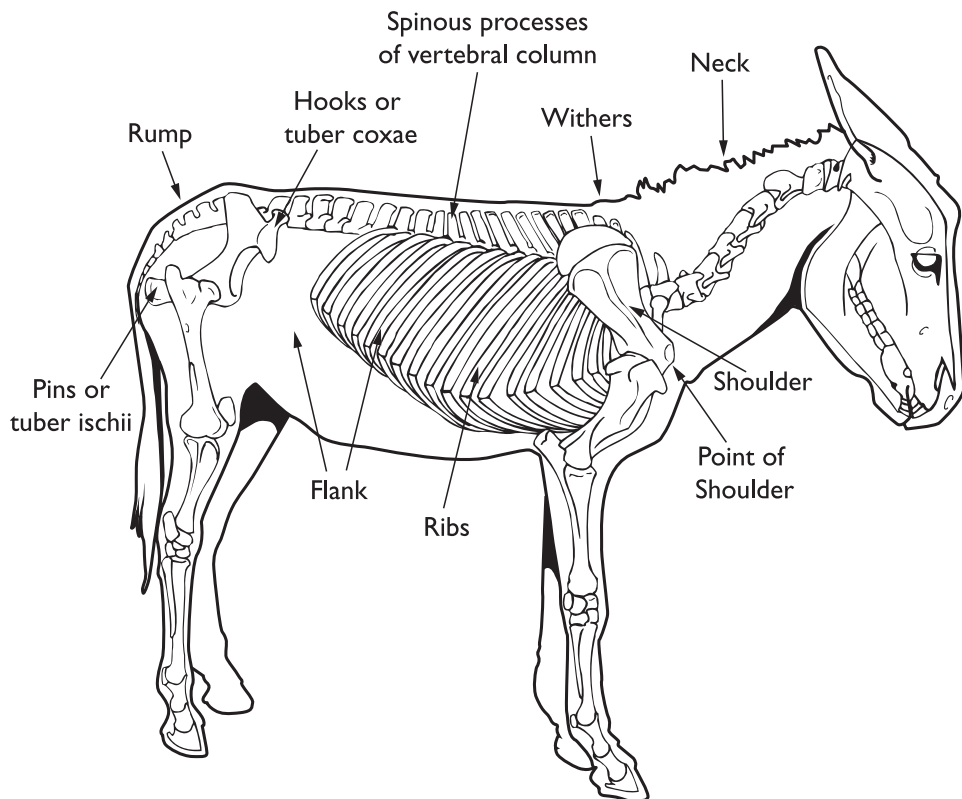
Look at the descriptions (Table 1), the main anatomical points to check (Figure 1) and illustrations of the different body condition scores (pages 5-13) before you start. Keep them near by to refer to.

Having made sure the donkey is standing quietly the next stage in the scoring assessment is to decide which of the three main categories the animal is within. Is it thin (1-3), fat (7-9) or somewhere in between (4-6)? To decide this look at the donkey from the side and the back, walk around it slowly. Is the frame obvious (thin)? Is the frame not as visible as the covering (fat)? Are the frame and covering well balanced, with neither one more obvious than the other (medium)?

Once this is decided then examine the animal more closely, looking and feeling the areas where fat and muscle accumulate: the neck, shoulders, back, ribs, flanks and rump. Not all donkeys are the same. One donkey may accumulate a lot of fat on the neck and not a lot on the rump or ribs, whereas another may be the opposite. So each area should be assessed and combined to give an overall condition score. The technical terms for the areas of the body that it is useful to look at and feel, and which feature in the descriptions of the different scores are given in Figure 1.

Figure 1.

The main anatomical points to check visibly and by feel in the assessment of body condition of a donkey (see Table 1 also).



Note : The spinous processes are the bony points rising from the spine (backbone). The superspinous muscle is the muscle along each side of the backbone.

Table 1. Description of the body condition scores for donkeys on a scale from 1 to 9.

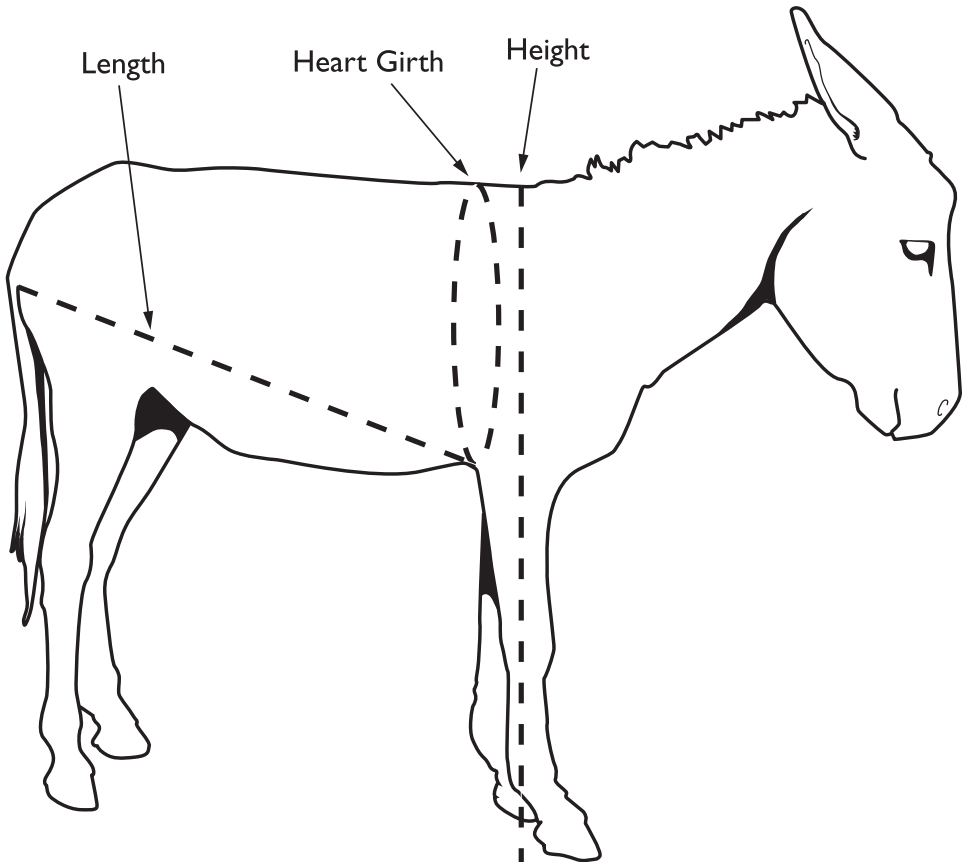
SCORE	DESCRIPTION
1. Very thin (Emaciated)	Animal markedly emaciated; bone structure easily seen over body; little muscle present; animal weak, lethargic.
2. Thin	Animal emaciated; individual spinous processes, ribs, hooks (tuber coxae), pins (tuber ischii), shoulder blades and spine all prominent, sharply defined; some muscle development; neck thin; prominent withers; shoulders sharply angular.
3. Less thin	Vertebral column prominent and individual spinous processes can be felt; little fat, but superspinous muscle over spinous processes apparent; ribs, pins, (tuber ischii) and hooks (tuber coxae) prominent; loin area and rump concave; little muscle or fat covering over withers and shoulders.
4. Less than moderate	Vertebral column visible; pins (tuber ischii) can be felt but not visible; hooks (tuber coxae) rounded but visible; rump flat rather than concave; ribs can be felt but not obvious; withers, shoulders and neck have some muscle and fat cover; shoulder blades less clearly defined.
5. Moderate	Superspinous muscles developed and readily apparent; vertebral column can be felt; hooks (tuber coxae) rounded; rump rounded, convex; pins (tuber ischii) not visible; some fat can be felt in shoulder area region and at base of neck; can feel ribs, but not visible.
6. More than moderate	Cannot feel spinous processes easily; back becoming flat well covered; rump convex and well muscled; some fat can be felt on neck, base of neck and shoulder area; neck filled into shoulder; hooks (tuber coxae) just visible.
7. Less fat	Back flat; cannot feel spinous processes; hooks (tuber coxae) just visible; fat on neck and shoulder area beginning to expand over ribs; flanks filling, neck thickening.
8. Fat	Animal appears well covered with body rounded with fat and bones not discernible; flanks filled, broad back.
9. Very fat (obese)	Bones buried in fat; back broad or flat, in some cases crease along the backbone; large accumulations of fat on neck, over shoulder area and ribs; flank filled with fat.

Notes: 1-3 frame obvious. 4-6 frame and covering balanced. 7-9 frame not as obvious as covering.

The spinous processes are the bony points rising from the spine or backbone. The superspinous muscle is the muscle along each side of the backbone. Individual donkeys can deposit their body fat in different areas of the body, so the individual neck, shoulders, ribs, rump, and flank condition should be assessed and combined to give an overall condition score.

Estimation of Live Weight

Over 500 donkeys were weighed and measured in the souks in Morocco to produce equations to estimate the live weight of an adult working donkey. It is important to note that the equations were produced from measurement of adult donkeys that were mainly within the body condition score from 2 to 6, and height of 90-120 cm, so the equations are likely to give the most accurate estimates for animals within these ranges. For animals of body conditions of 7 and over it is recommended that the equation produced by the International Donkey Protection Trust is used. It is given at the end of this section.



Using two body measurements

The best equation to use to estimate live weight of an adult donkey is one which involves taking two measurements on the donkey - the girth and the length (Figure 2).

The girth

The girth is the measurement around the body just behind the front legs, in centimetres (cm). This is sometimes called the heart girth to distinguish it from the girth around the widest part of the donkey, which is sometimes called the umbilical girth.

The length

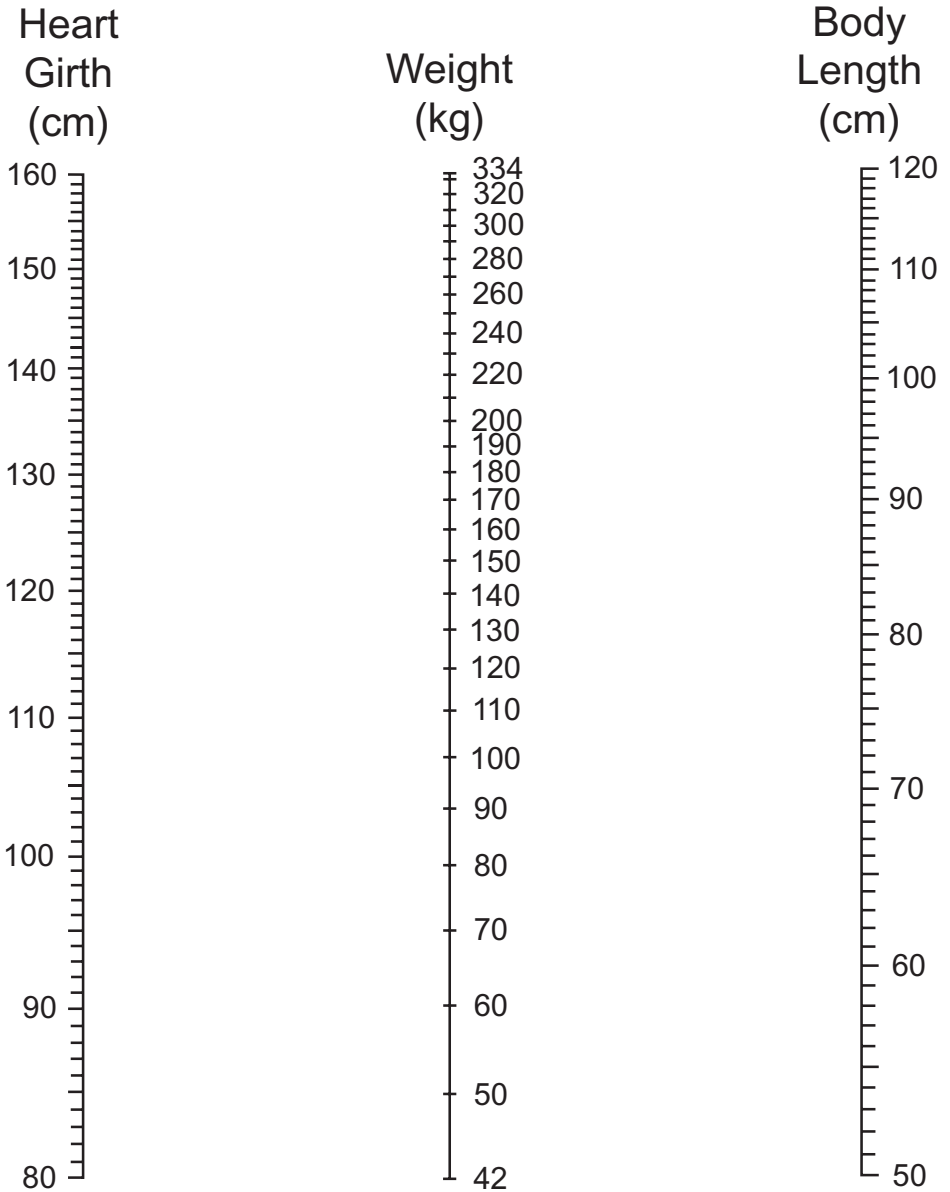
The length is the distance from the pin bone (tuber ischii) to the elbow in a straight line in centimetres (cm). This is easier to take and is more repeatable than measurement along the whole of the body from the point of the shoulder to the pin bone.

Having obtained the measurements the next stage is to estimate the live weight. This can be done in two ways:

1. Use the nomogram provided (Figure 3). draw a line on the chart using a ruler to link the girth measurement (cm) and the length measurement you have recorded for the donkey. Read off the weight where the pencil line crosses the weight line on the nomogram. This is the estimated live weight of the donkey. The advantage of this method is that you do not need a calculator to work out the live weight.
2. Use a calculator to work out the estimated live weight from the following formula:

$$\text{Live weight (kg)} = (\text{heart girth [cm]}^{2.12}) \times (\text{length [cm]}^{0.688}) / 3801$$

Figure 3. Nomogram



Using one body measurement

Live weight can be estimated from just the measurement of heart girth, it is not as accurate as using the two measurements girth and length, but in some cases may be the only measurement possible. e.g. if the donkey is not easily handled, or will not stand for long or there is no one to assist in holding the animals. In this case a nomogram is not possible and a different formula is used to calculate the estimated live weight:

$$\text{Live weight (kg)} = \text{heart girth (cm)}^{2.65}/2188$$

Tips when measuring a donkey

Make sure that the donkey is standing quietly with enough space for you to be able to walk around and handle it and without it being distracted by others. It should be standing in a well-lit area so you can see it clearly. Make sure it is standing on level ground and is standing 'square' with its front feet next to each other and its back feet next to each other and its body straight.

Make sure you have a good measuring tape. For the girth it is best to have a soft tape such as that used in sewing clothes. If you only have a stiff metal tape such as that used in carpentry, then use a piece of string to measure round the girth and then measure it against the stiff tape afterwards.

A stiff metal measuring tape is easier to use for measuring the length, but if you do not have one then use a stick, marking the distance from elbow to pin bone (tuber ischii) on the stick and measure the distance using the soft tape afterwards.

Estimation of live weight of fat donkeys

It is recommended when estimating the live weight of donkeys that are doing little work and that have a body condition score of seven or over that the following equation is used to estimate live weight from the height at the withers and the heart girth.:

$$\text{Live weight (kg)} = (\text{heart girth [cm]}^{2.575}) \times (\text{height [cm]}^{0.240}) / 3968 \text{ (Svendsen, 1997)}$$

References

- Nicholson, M.J. and Butterworth, M.H. 1985. *A guide to condition scoring of zebu cattle*. International Livestock Centre for Africa, P.O. Box 5689, Addis Ababa, Ethiopia.
- Pearson, R.A. and Ouassat, M. 1996. Estimation of the live weight and body condition of working donkeys in Morocco. *The Veterinary Record* 138, 229-233.
- Svendsen, E.D. 1997. *The Professional Handbook of the Donkey*. 3rd Edition, Whittet Books, Ltd, London.
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