

BODY CONDITION SCORES FOR DESERT TORTOISES

Nadine Lamberski, DVM, Dipl. ACZM

San Diego Zoo Safari Park, 15500 San Pasqual Valley Road, Escondido, CA 92027 USA



Introduction

Body condition scoring is a visual appraisal system that estimates average body energy reserves without using scales, calipers, or calculators.^{1,2} Since individuals can vary in size and shape, weight alone is not a good indicator of body condition. The body condition score (BCS) is based on an evaluation of muscle mass and fat deposits in relation to skeletal features and has been adapted to the desert tortoise (*Gopherus agassizii*). This score is dynamic and should improve if the animal is eating and body energy reserves increase. Conversely, the score will decrease if inanition persists or body energy reserves are depleted.³

Adapting BCS for Tortoises

BCS ranges from one to nine, with one being emaciated and nine being extremely obese. Assigning a BCS is a two-step process. The numbers are divided into 3 groups.

STEP 1: Choose the grouping that best describes the tortoise at the current point in time.

- a) Under condition (1-3): best assessed by degree of temporalis muscle atrophy and prominence of the sagittal crest;
- b) Good condition (4-6): best assessed by degree of temporalis muscle development;
- c) Over-condition (7-9): best assessed by degree of subcutaneous fat deposition.

STEP 2: More accurately identify the score by selecting one of the three numbers in the given ranges. Choose the best fit for that individual at this current point in time.



Fig. 1: BCS 1, severe atrophy of the temporalis muscle, visible sagittal crest.



Fig. 2: BCS 2, atrophy of the temporalis muscle, visible sagittal crest.



Fig. 3: BCS 3, slight atrophy of the temporalis muscle, sagittal crest visible.



Fig. 4: BCS 4, no obvious atrophy of the temporalis muscle, sagittal crest not visible, flat appearance to the top of the head.



Fig. 5: BCS 5, developed temporalis muscle with a bi-lobed appearance to the top of the head.



Fig. 6: BCS 6, very well-developed temporalis muscle with an almost rounded appearance to the top of the head.



Fig. 7: BCS 7, subcutaneous fat present in pre-femoral and cervical regions.



Fig. 8: BCS 8, moderate amount of subcutaneous fat pinched between fingers in the axillary region.



Fig. 9: BCS 9, obese animal with large amount of subcutaneous fat especially evident in the cervical and axillary regions.

Fig. 1-9: Body Condition Scores (BCS) 1-9 for Desert Tortoises. BCS 1-3 are tortoises in poor or under-condition, BCS 4-6 are in good condition, and BCS 7-9 are obese or in over-condition.

	BCS 1	BCS 2	BCS 3	BCS 4	BCS 5	BCS 6	BCS 7	BCS 8	BCS 9
Sagittal crest visible	extreme	yes	slight	no	no	no	no	no	no
Sagittal crest palpable	yes	yes	yes	slight	no	no	no	no	no
Temporalis muscle developed	no	no	no	slight	yes	yes	yes	yes	yes
Muscle atrophy (limbs)	extreme	yes	yes	slight	no	no	no	no	no
Subcutaneous fat (pre-femoral space)	no	no	no	no	no	slight	yes	extreme	extreme
Subcutaneous fat (limbs and tail base)	no	no	no	no	no	slight	slight	yes	extreme

Table 1. BCS scores are assigned based on an evaluation of muscle and fat deposits relative to skeletal features.

Conclusion and Relevance

A tortoise's body condition will change with life stage, stage of reproduction, season of the year, drought, food availability, and disease. Therefore, this management tool can be used to monitor and compare populations over time.

Acknowledgements

The author gratefully acknowledges the contributions of the staff of the Desert Tortoise Conservation Center, Las Vegas, Nevada, in the development of this protocol.

Literature Cited

1. Bewley, J. M., and M. M. Schutz. 2008. Review: an interdisciplinary review of body condition scoring for cattle. *The Prof. Anim. Sci.* 24: 507-529.
2. Stevenson, R. D. and W. A. Woods, Jr. 2006. Condition indices for conservation: new uses for evolving tools. *Integr. Comp. Bio.* 46: 1169-1190.
3. Lamberski, N., Braun, J., Witte, C., Christopher, M., Field, K., Averill-Murray, R., Keener, L., Robbins, P., Johnson, J., Covert, A., Walsh, A., and B. Rideout. 2012. Identifying key clinical signs and validating body condition scores to minimize disease spread and maximize individual survival during desert tortoise translocations. *Proc. Joint Ann. Meeting Wildl. Dis. Assoc. and European Assoc. Wildl. Dis.* Lyon, France.