

BODY CONDITION SCORING: CERVIDAE



BASICS

OVERVIEW

- Body condition scoring (BCS) of cervid species has been adapted from scoring systems used in domestic livestock and can be used by veterinarians, wildlife specialists, and farm managers as an invaluable tool for monitoring the health and nutritional status of a herd.
- When evaluating BCS in cervids, it is important to understand the annual appetite cycle, which is influenced by photoperiod and will result in changes in food intake and body condition score in both males and females depending on the time of year and reproductive status.
- A variety of techniques have been described to evaluate body condition in cervids, including carcass evaluations, visual appraisal, palpation estimations, and hematologic analyses.
- The techniques described have each only been validated in a few species. While extrapolation of this data has been proved to be useful for use in other cervid species, care should be taken when interpreting the data obtained

INCIDENCE/PREVALENCE

- N/A

GEOGRAPHIC DISTRIBUTION

- Worldwide, depending on species

SYSTEMS AFFECTED

- Musculoskeletal
- Other systems (reproductive, neurologic) may be affected in cases due to large variations in BCS

PATHOPHYSIOLOGY

- Body adipose tissue reserves are a reflection of the state of energy balance of an animal
- In situation of positive energy balance, the animal's body stores extra energy in the form adipose tissue while in states of negative energy balance the store fat is mobilized.
- Severe loss of body condition affects reproductive efficiency and neonatal survival

SIGNALMENT

Cervidae species

HISTORICAL FINDINGS

- Routine herd evaluation
- Herd investigation for poor reproductive efficiency

- Pre or post mortem examination of individual animals
- Carcass evaluation for meat production

PHYSICAL EXAMINATION FINDINGS

Scoring by carcass evaluation

- Carcass evaluation is useful for evaluating nutritional adequacy at a herd level, and can be used at slaughter/necropsy by field biologists or veterinarians.
- This technique, described by Kistner et al. (1980), is based on visual estimation of the fullness of body musculature and the relative amounts of fat in 6 indicator sites: base of heart and coronary groove, pericardium, omentum, kidneys, tailbase and rump, and brisket.
- Body musculature is assigned 0 points for a bony carcass or 5 points for a carcass with full musculature.
- A rating of 0 to 15 points is assigned to each indicator site in 5-point increments: 0 = no visible fat; 5 = slight quantities of fat; 10 = moderate amounts of fat; 15 = heavy quantities of fat
- After each site is rated, a total carcass score is calculated with scores ranging from 0 to 95 points, with mean scores for sex and age-classes determined separately.
- Arbitrary condition classes can be assigned based on total carcass scores: 0-10 = emaciated; 11-40 = poor; 41-70 = fair; 71-80 = good; 81-95 = excellent.

Scoring by palpation

- A body condition scoring system has been adapted from those used in domesticated livestock for use in cervid species with a range from 1 to 5. This technique has been described in most depth for red deer and mule deer, but has also been extrapolated for use in other cervid species.

Scoring System (derived from Audigé et al. 1998)

1- Emaciation or Cachexia

- Wings of pelvis (hooks) extremely prominent
- Sacral spinous processes very sharp
- No fat cover
- Little muscle in rump (thurl) area, which is concave

2- Poor Condition (Leanness)

- Sub-optimal for females, may be normal for mature males just after the rut
- Hooks prominent, but rounded and easily felt by palpation without finger pressure
- Sacral spinous processes prominent
- Rump slightly concave

3- Moderate Condition

- Hooks prominent, rounded, and easily felt with slight finger pressure
- Sacral spinous processes slightly enveloped and not prominent
- Rump flat

4- Good Condition

- Tending to be obese for females, midsummer condition for males

- Hooks rounded, can be felt under a thin layer of fat
- Sacral spinous processes enveloped and can only be felt with firm pressure
- Rump slightly convex

5- Obese

- Seldom appropriate for females, normal for males just before the onset of the rut
- Hooks concealed under a thick layer of fat and not readily palpated
- Sacral spinous processes only palpable with firm pressure
- Rump convex

Scoring by observation

- The accompanying table provides 7 anatomical points that are judged to try to obtain an overall picture if palpation is not an option.
- It is almost impossible to see and accurately evaluate all 7 points in 1 animal. Not only does the position and posture of the animal relative to the observer vary from animal to animal, but also ambient light conditions can have an effect, particularly in relation to the casting of shadows.

REMOTE BODY CONDITION SCORING - WAPITI

	RIBS	WITHERS	HOOKS & PINS	THURL (RUMP)	TAIL HEAD	SPINE	TRANSVERSE PROCESSES
1	All visible	Very sharp	Very sharp	Sharp angle, very sunken	Concave, no flesh	Very prominent above ribs; each vertebra distinct	Visible and prominent
2	All visible	Very sharp	Prominent	Sunken or flat	Sunken, minor flesh covering	Individual processes evident; distinct vertebrae	Visible
3	Last 2 barely visible	Smooth V shape	Smooth	Flat or slightly convex	Flat and smooth		
4	None evident	Rounded	Rounded with fat	Convex	Rounded; tail starting to form a dip in fat	Flat, no distinct vertebrae	Barely visible
5	None evident	Very rounded	Buried in fat	Rounded, fat	Buried in fat	Buried in fat, no distinct vertebrae	Rounded and fat covered

BCS 5 animals also have a fat buildup under the abdomen and the brisket is wide and deep with fat.

Scoring by hematological analyses

- Serum thyroxine (T₄) and insulin-like growth factor (IGF-1) have been found to be moderately correlated to body condition in elk, whereas leptin plasma concentrations have been found to be positively correlated with BCS in red deer hinds.

- Hematological analyses of these or other parameters, with further investigation and validation amongst species, may become useful for providing an objective assessment of body condition in cervids.

GENETICS

- N/A

CAUSES AND RISK FACTORS

- BCS score change with production cycle (lactation, breeding, pregnancy) and quality of nutritional program



DIAGNOSIS

DIFFERENTIAL DIAGNOSIS

- Differential diagnosis of causes of weight loss include poor nutrition, poor dentition, heavy parasitism, trace mineral deficiencies

CBC/BIOCHEMISTRY/URINALYSIS

- Indicated if a systemic disease is suspected

OTHER LABORATORY TEST

- Parasitology
- Feed analysis

IMAGING

- N/A

OTHER DIAGNOSTIC PROCEDURES

- Depend on suspected condition

PATHOLOGIC FINDINGS

- Depend on suspected condition



TREATMENT

THERAPEUTIC APPROACH

- In cases of weight loss: treat the underlying cause and rectify the nutritional program particularly in older animals

SURGICAL CONSIDERATIONS AND TECHNIQUES

- N/A



MEDICATIONS

DRUGS OF CHOICE

- Depend on suspected cause of poor BCS

CONTRAINDICATIONS

- N/A

PRECAUTIONS

- N/A

POSSIBLE INTERACTIONS

- N/A



FOLLOW-UP

EXPECTED COURSE AND PROGNOSIS

- Usually good prognosis if the underlying cause is determined and is treated promptly

Males

- Mature (> 4 year old) males should be at their fattest in late summer with BCS of 4.5 to 5 just before the onset of the rut.
- Adult males will lose up to 25% of body weight over a 6 to 8 week period during the rut, even when adequate food is made available due to decreased voluntary feed intake and increased fat mobilization. $BCS \leq 2$ to 2.5 are usually seen after this time.
- Male farmed deer should be managed accordingly with plentiful access to high quality feed after the end of the peak of the rut (about Nov 1 to 15 in the Northern Hemisphere for wapiti and red deer and Dec 15 to 31st whitetail and mule deer) to allow body condition to improve (BCS up to 3) and ensure that the animal survives the winter.

Females

- Adult females with a $BCS > 2.5$ and yearling females with $BCS < 3.5$ are most likely to successfully conceive early in the breeding season.
- Pregnant females should steadily increase BCS throughout early gestation and be in good body condition at the beginning of winter to ensure that there is adequate fat and energy stores to meet the demands of the rapidly growing fetus throughout the winter months when voluntary feed intake is depressed.
- Females with $BCS > 3.5$ after the winter are more predisposed to dystocia.
- Females should not lose condition during lactation; milking potential and weanling performance may be compromised in lactating females with a $BCS \leq 2.5$

POSSIBLE COMPLICATIONS

- Severe loss in BCS may result in metabolic disorders

CLIENT EDUCATION

- Importance of observation of individual animals (particularly geriatric animals)
- Importance of a herd health program with parasite prevention
- Hand-on training in body condition scoring technique and use for management

PATIENT CARE

- N/A

PREVENTION

- Adequate nutritional and herd health preventive program



MISCELLANEOUS

ASSOCIATED CONDITIONS

- Chronic Wasting Disease is a transmissible spongiform encephalopathy that affects mule deer, white-tailed deer, moose, red deer and elk (1 report from Northern Europe of reindeer) with affected animals showing subtle and prolonged loss of body condition and changes in behavior.
- Johne's disease (*Mycobacterium avium* subspecies *paratuberculosis*) is an infectious bacterial disease of ruminants that also presents with a chronic loss of body condition.
- Both of these conditions are inevitably fatal and should be tested for at necropsy if suspected.

AGE-RELATED FACTORS

- N/A

ZOONOTIC POTENTIAL

- N/A

PREGNANCY

- Females should be of appropriate BCS to ensure adequate conception rates and prevent problems with parturition (see above).

BIOSECURITY

- N/A

PRODUCTION MANAGEMENT

- BCS can be used in farmed populations to ensure that an adequate nutritional program is in place or to monitor animals if changes were made.
- $BCS \leq 2$ is usually a sign of emaciation or disease, except in males at the end of rut.
- BCS of 1 generally indicates that an animal is near death.
- The techniques described have each only been validated in a few species. While extrapolation of this data has been proved to be useful for use in other cervid species, care should be taken when interpreting the data obtained.

- Coat condition varies according to the time of year, and the long shaggy winter coat can mask the contours of the underlying skin and muscle masses, especially in thin animals, and reduce objectivity, creating misleading scores. Hence, palpation is a more reliable measure than mere observation. This is particularly the case with evaluation of the shape of the thurl.
- Remote observation should be used with caution because repeatability is low and the technique can be misleading.

ABBREVIATIONS

BCS = body condition score

SYNONYMS

- N/A

SEE ALSO

- Cervidae: Captive Management
- Cervidae: Chronic Wasting Disease
- Cervidae Mortality
- Nutrition and Metabolic Diseases: Cervidae

SUGGESTED READING

- Audigé, L., Wilson, P.R., Morris, R.S. 1998. A body condition scoring system and its use for farmed red deer hinds. *NZ J of Agric Res* 41:545–553.
- Cook, R., Cook, J.G., Murray, D.L., Zager, P., Johnson, B.K., Gratson, M.W. 2001. Nutritional condition models for elk: which are the most sensitive, accurate, and precise? *J Wildl Manage* 65:988–997.
- Cook, R.C., Stephenson, T.R., Myers, W.L., Cook, J.G. and Shipley, L.A., 2007. Validating predictive models of nutritional condition for mule deer. *J Wildl Manage*, 71(6), pp.1934–1943.
- Cook, R.C., Cook, J.G., Stephenson, T.R., Myers, W.L., Mccorquodale, S.M., Vales, D.J., Irwin, L.L., Hall, P.B., Spencer, R.D., Murphie, S.L. and Schoenecker, K.A., 2010. Revisions of rump fat and body scoring indices for deer, elk, and moose. *J Wildl Manage*, 74(4), pp.880–896.
- Gerhart, K.L., White, R.G., Cameron, R. and Russell, D.E., 1996. Estimating fat content of caribou from body condition scores. *J Wildl Manage*, pp.713–718.
- Kistner, T.P., Trainer, C.E. and Hartmann, N.A., 1980. A field technique for evaluating physical condition of deer. *Wildlife Society Bulletin*, pp.11–17.
- Zebarth, G. 1995. Body condition scoring for elk cows. *North American elk* 5(1):54–56.

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