

Locomotion and mobility assessment for brown bears (*Ursus arctos*) under human care

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INTRODUCTION



Degenerative joint disease is a chronic painful condition which might negatively affect animal welfare. Brown bears (*Ursus arctos*) under human care are known to suffer from osteo- and spondyloarthritic modifications¹, especially with increasing age².

This study aimed to create a reliable and feasible scoring system to assess the locomotion and mobility of brown bears housed in FOUR PAWS sanctuaries, during the caretakers' daily routine.

MATERIALS AND METHODS

Literature research on existing scoring systems³ and direct observations of the brown bears housed by FOUR PAWS were conducted to create the assessment tool. Six assessors scored on video the locomotion and mobility of eleven bears. The tool was adjusted based on the assessors' feedback and, according to that, used to directly assess eight bears in the field. The scores given in the two settings were analysed to test the inter-observer reliability (IOR) by calculating the Intraclass Correlation Coefficient (ICC) for each measure.



RESULTS

 On video  In field

Locomotion and mobility assessment



Lameness

If score > 0 and possible to identify, indicate the leg/s affected: Front Right, Front Left, Hind Right, Hind Left

ICC (95% CI)
 0.93 (0.82 to 0.98)
 0.88 (0.70 to 0.97)



- 0: Normal gait pattern
- 1: Mild lameness when walking
- 2: Moderate lameness when walking with normal stride length and partial weight bearing might be seen
- 3: Moderate lameness when walking with shorter stride length or reduced lifting of the limb and partial weight bearing might be seen
- 4: Severe lameness when walking with attempt of minimal use of the limb. Instability might be shown.
- 5: Reluctance to rise and/or walk.
- 6: Not weight bearing

Stiffness

ICC (95% CI)
 0.91 (0.76 to 0.98)
 0.63 (0.06 to 0.91)



- 0: Movement is fluid, not rigid and does not show muscular contracture
- 1: Movement is slightly rigid and the body looks moderately contracted
- 2: Movement is highly rigid and the body moves highly contracted

Loss of coordination/hyperesthesia

ICC (95% CI)
 0.95 (0.87 to 0.99)
 1

- 0: Walking or standing not showing any sign of loss of coordination
- 1: A mild to moderate uncoordinated movements can be seen while the bear is walking and/or exaggerated movements of the limbs
- 2: Moderate to severe uncoordinated movements can be seen while the bear is walking and/or standing and/or exaggerated movements of the limbs
- 3: The bear cannot keep the balance, falling on the ground



Back arched

ICC (95% CI)
 0.72 (0.31 to 0.93)
 -0.25 (-2.93 to -0.76)

- Yes
- No

Activity/Mobility*



Seen standing up (on 4 legs) from lying position:

ICC (95% CI)
 0.93 (0.84 to 0.98)
 0.69 (0.15 to 0.93)



- No
- Yes

Quality

- 0: Normal
- 1: The action requires more time and effort
- 2: Very difficult for the bear

ICC (95% CI)
 1
 0.36 (-0.74 to 0.90)



Seen lying down or sitting down:

ICC (95% CI)
 1
 0.8 (0.44 to 0.96)



- No
- Yes

Quality

- 0: Normal
- 1: The action requires more time and effort
- 2: Very difficult for the bear

ICC (95% CI)
 0.81 (0.03 to 1)
 0.41 (-0.44 to 0.89)



Seen standing upright (on 2 hind legs)

ICC (95% CI)
 1
 0.93 (0.80 to 0.98)



- No
- Yes

Quality

- 0: Normal
- 1: The action requires more time and effort
- 2: Very difficult for the bear

ICC (95% CI)
 1
 1



Reaching food or enrichment placed high (the bear needs to shift back the body weight and extend the front legs)

ICC (95% CI)
 1
 0.96 (0.89 to 0.99)

- No
- Yes

Quality

- 0: Normal
- 1: The action requires more time and effort
- 2: Very difficult for the bear

ICC (95% CI)
 1
 1

Animal-based measures to assess the locomotion and mobility of brown bears under human care, with the respective ICC values, calculated to test the IOR on video and in the field (ICC reference values: high: 0.75 to 1 or -0.75 to -1; moderate: 0.5 to 0.75 or -0.5 to -0.75; weak: 0.25 to 0.5 or -0.25 to -0.5; very weak: 0 to 0.25 or 0 to -0.25⁴). The table shows the finalised tool, adjusted after the results and feedback of the assessment on video.

CONCLUSION

Based on the outcomes, the definition of 'back arched' was improved, and the finalised tool was included in the welfare assessment of brown bears in FOUR PAWS sanctuaries. The implication of such tool is to facilitate an early detection of locomotion and mobility changes, to monitor the progression of the disease and/or the effectiveness of pain management to improve overall bear welfare in the aging process.

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