SEASONAL FEEDING STRATEGIES FOR SOCIALLY HOUSED CAPTIVE BEARS

Heather J. Bacon BSc BVSc CertZooMed MRCVS

The introduction of a seasonal feeding strategy at the Animals Asia Foundation's China Bear Rescue Centre (CBRC) has aided in the development of cohesive social groups of up to 24 Asiatic black bears (*Ursus thibethanus*) rescued from the bear bile trade, and resulted in increased expression of natural foraging and denning behaviours. Additionally enhanced nutrition has resulted in increased alpha-tocopherol levels and optimised body condition scores of long term resident bears.

INTRODUCTION:

The nutritional management of bear social groups poses several challenges. Because bears are resource-driven species, mediation of food-related aggression is essential for the formation of a cohesive social group. Sub-optimal nutrition or excessive calorie intake may predispose to obesity or disease. Additionally, feeding strategies, in addition to enrichment, have a large impact on social interactions, mental stimulation and the expression of normal behaviours. This presentation will endevour to explore the feeding strategies at the China bear rescue centre, home to 177 Asiatic black bears and Eurasian brown bears (*Ursus arctos*)

WEIGHT MONITORING AND MANAGEMENT:

Obesity is a concern for many captive bear collections. At CBRC all bears are trained to enter a weigh cage for routine weighing every three months. All bears are condition scored during routine health checks and opportunistic condition scoring is also used to assess body condition and prioritise weight management issues.

Asiatic Black Bear Body Condition Score Chart

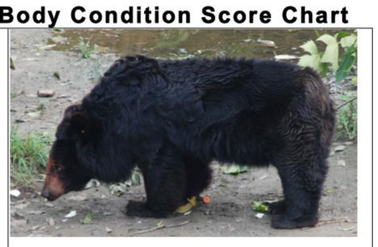
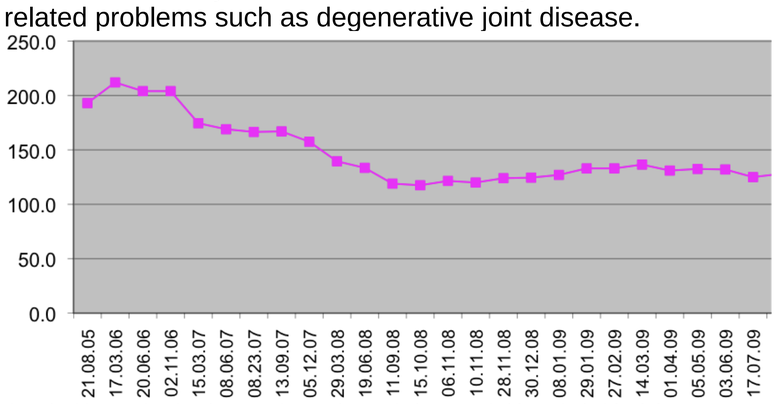
CONDITION SCORE 1: Pelvis and scapulae protruding, ribs easily palpated. Angular appearance, with no fat rounding out silhouette. A hollow will be noted between the pelvis and last rib showing virtually no fat.	
CONDITION SCORE 2: Pelvis easily palpated, but good muscle covering over rump, ribs also felt on palpation, but having some muscle covering them. The hollow between the pelvis and last rib obvious, but softer.	
CONDITION SCORE 3: Body is fully fleshed out. Obvious fat is present over pelvis and shoulders, ribs not visually obvious, but palpable. The hollow between the pelvis and last rib is absent.	
CONDITION SCORE 4: Bear has a rounded or blocky appearance, very well fleshed over all bony areas, obvious fat over the rump and shoulders. Ribs difficult to palpate. Caudal abdominal fat visibly hanging	
CONDITION SCORE 5: Legs appear too short for the body, rolls of fat on the neck and lower shoulders. Unable to palpate ribs. Caudal abdominal fat visibly hanging. Noticeably rounded rump	

Table 1. Animals Asia Foundation Asiatic black bear body condition score chart (adapted from polar bear TAG chart.

The provision of calorie-dense, nutrient-poor diet items such as bread or cereal should be reduced or avoided and high quality protein sources, fruit and vegetables provided to ensure an adequate range of micronutrients.

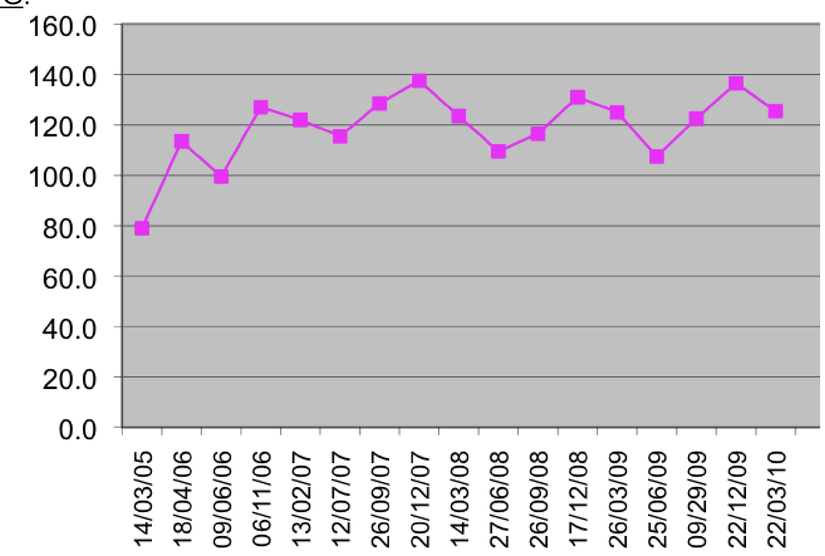
LIFE STAGE:

Sub-adult male bears have a relatively enormous requirement for calories, protein and fat in order to ensure their continued growth and prevent food-aggressive tendencies developing and so should be well-nourished prior to integration with conspecifics. At CBRC male Asiatic black bears aged approx 3-5 years old are often fed 2-3 times the calorie intake of an adult resident bear to ensure satiety and reduce any negative anticipatory behaviours. Rescued Asiatic blacks generally do not display seasonal feeding behaviours until full body condition has been restored and social interactions are established. Older bears have a reduced calorific requirement and are generally more sedentary. Their energy intake should be carefully controlled and their body condition score monitored to prevent obesity and related problems such as degenerative joint disease.



Graph 1. Weight loss associated with a reduction in BCS from 5/5 to 3/5 in an arthritic Asiatic black bear.

SEASONAL FEEDING:



Graph 2. Typical seasonal weight fluctuations in an Asiatic black bear.

Bears are naturally seasonal feeders and even in relatively tropical areas some seasonality of behaviour may be observed. Temperature, day length, life stage and food availability all appear to contribute to feeding behaviour. Observations at CBRC have demonstrated a positive feedback with increased seasonality of management resulting in an increase in natural seasonal behaviours of bears. The general seasonal feeding pattern at CBRC is as follows:

Season	Behavioural cues	Dietary modification	Behavioural response
Spring	Activity increasing after period of winter dormancy, but still quite sleepy.	Increased vegetables and browse provided, low amounts of protein and fat fed.	Increased activity levels and interest in food. Period of biggest weight loss and least food aggression
Summer	Increased activity and relatively stable appetites	Food amounts relatively stable but gradual increase in all food groups towards the end of the summer, depending on behavioural demonstrations of satiety	Weight = gradual loss or stable. Good activity levels and increasing foraging times.
Autumn	Physiological drive for calorie-dense foods prior to winter. Anticipatory behaviour and feeding aggression starts to develop.	Higher levels of protein and fat fed to meet increased calorific requirements. Vegetable amounts are increased also to add 'bulk'. A variety of nuts added to daily diet to mimic the natural nut masting season	Long time periods spent foraging. Bears may gain 20-30% of body weight over a period of 2-3 months
Winter	Reduced anticipatory feeding behaviour and reduced feed consumption	All food offered is gradually reduced, especially items high in protein and fat	Reduced activity, and increased denning behaviour. Denning partnerships likely to be formed especially among female bears.

Table 2. Seasonal feeding patterns and behaviour at CBRC

NUTRITIONAL STATUS:

There is little published data on nutritional requirements of Asian bear species. Regular monitoring of physical appearance, body condition score, activity and the development of pathology and disease may indicate nutritional deficiencies, but even bears that look good on the outside may be harbouring subclinical disease which may manifest at a later date.

Many Asiatic black bears at CBRC suffer from ocular pathology with retinal degeneration, cataracts and lens luxation. After clinical investigation of these ocular presentations, vitamin E deficiency was determined to be a likely initiating cause and so analysis of serum alpha tocopherol levels were performed.

Bear ID	Date sampled	Results (mmol/L)
S009	27.06.01 24.08.07	Not detected 0.049
S097	17.11.03 08.08.07	Not detected 0.074
S004	20.06.01 02.01.08	Note detected 0.062

Note:
Wild polar bear alpha tocopherol level = 0.049 +/- 0.014 mmol/L

Table 3. Paired serum vitamin E results from Asiatic black bears.

Preliminary results show that whilst vitamin E deficiency is a problem in bears newly arrived from bile farms, serum alpha tocopherol levels rise to approximate those reported in other bear species once an adequate diet is provided at CBRC. It is hoped that appropriate dietary support will prevent further development of ocular pathology.

CONCLUSION:

The application of nature-based seasonal feeding strategies may help to contribute to the physical and behavioural well-being of captive bears. Provision of good quality food resources can promote social harmony whilst ensuring physical condition. Attention should be paid to individual bear requirements within the group.