

How much should
a pet weigh?

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- How to determine ideal weight of pet?
- Hills diagnostic tools
- Research behind – BCS, BFI, MM
- How to perform measurements for dog
- How to perform measurements for cat

What is ideal weight of Sorkie ?

Nutritional Assessment Screening Evaluation

Nutritional History

Body Weight

Body/Muscle Condition score



Overweight
BCS > 3/5 or > 5 /9

Traditional BCS only Validated for pets with **< 50% Body Fat**

5 Point BCS	% Body Fat	9 Point BCS	% Body Fat
3	16-25	5	23-27
4	25-35	6	28-32
5	36- 45	7	33-37
		8	38-43
		9	44-47

The Domino Effect of Starting with the **Wrong Ideal Weight**

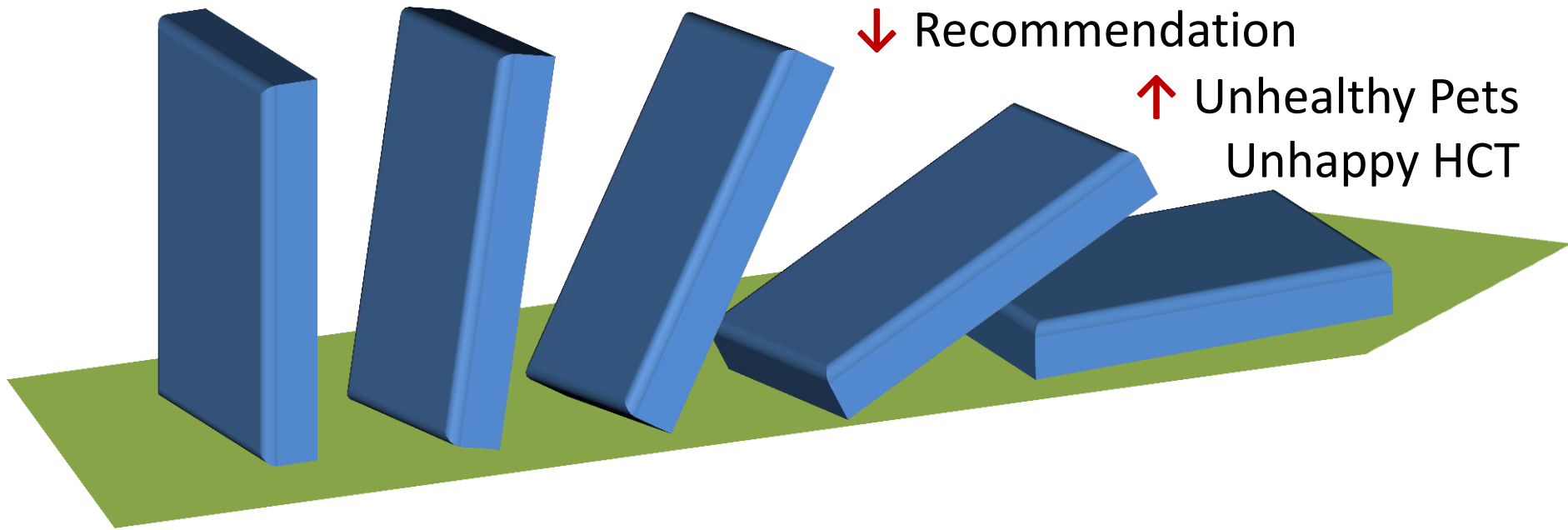
Inaccurate
Starting
Point

↓ Success

↑ Frustration

↓ Recommendation

↑ Unhealthy Pets
Unhappy HCT





Research behind the tools

1. step - to evaluate **current BCS** compare to **DEXA**
2. step - to validate **BFI** compare to **DEXA**
3. step – to validate a new clinical method of measuring body composition in dogs and cats = **Morphometric measurement** compare to **DEXA**

Study Designed to **Evaluate Accuracy of Diagnostic Tests** to assess **Body Composition**

DEXA = Gold Standard



- ☐ Morphometric Measurements
- ☐ BFI Risk Chart
- ☐ Traditional BCS



ACVIM Abstracts 2010

Study Population

Variety of Breeds and Sizes

83 Client-owned Dogs

Eighty three client owned dogs

Age: Range: 1 to 12 years, Average 6 years
Gender: 47 females (5 intact), 36 males (3 intact)
Weight: Range 11 to 162 lbs, Average: 58 lbs
Body Fat: Range: 20% to 65%, Average: 44%
Breed: 64 (77%) were identified as a specific breed,
19 (23%) were classified as mutt or other

Number in each breed classification: 1 BASSET HOUND, 1 BOSTON TERRIER, 1 BOXER, 1 BULLMASTIFF, 1 CORGI, 1 DOBERMAN PINSCHER, 1 FLAT-COATED RETRIEVER, 1 FRENCH BULLDOG, 1 GERMAN SHEPHERD DOG, 1 POODLE, 1 RAT TERRIER, 2 BORDER COLLIE, 2 CHIHUAHUA, 2 JACK RUSSELL TERRIER, 2 MINIATURE PINSCHER, 2, PIT BULL TERRIER, 2 PUG, 2 ROTTWEILER, 2 SHETLAND SHEEPDOG, 2 SHIH TZU, 3 COCKER SPANIEL, 4 AUSTRALIAN SHEPHERD, 5 BEAGLE, 6 GOLDEN RETRIEVER, 6 OTHER, 7 DACHSHUND, 10 LABRADOR RETRIEVER, 13 MUTT

76 Client-owned Cats

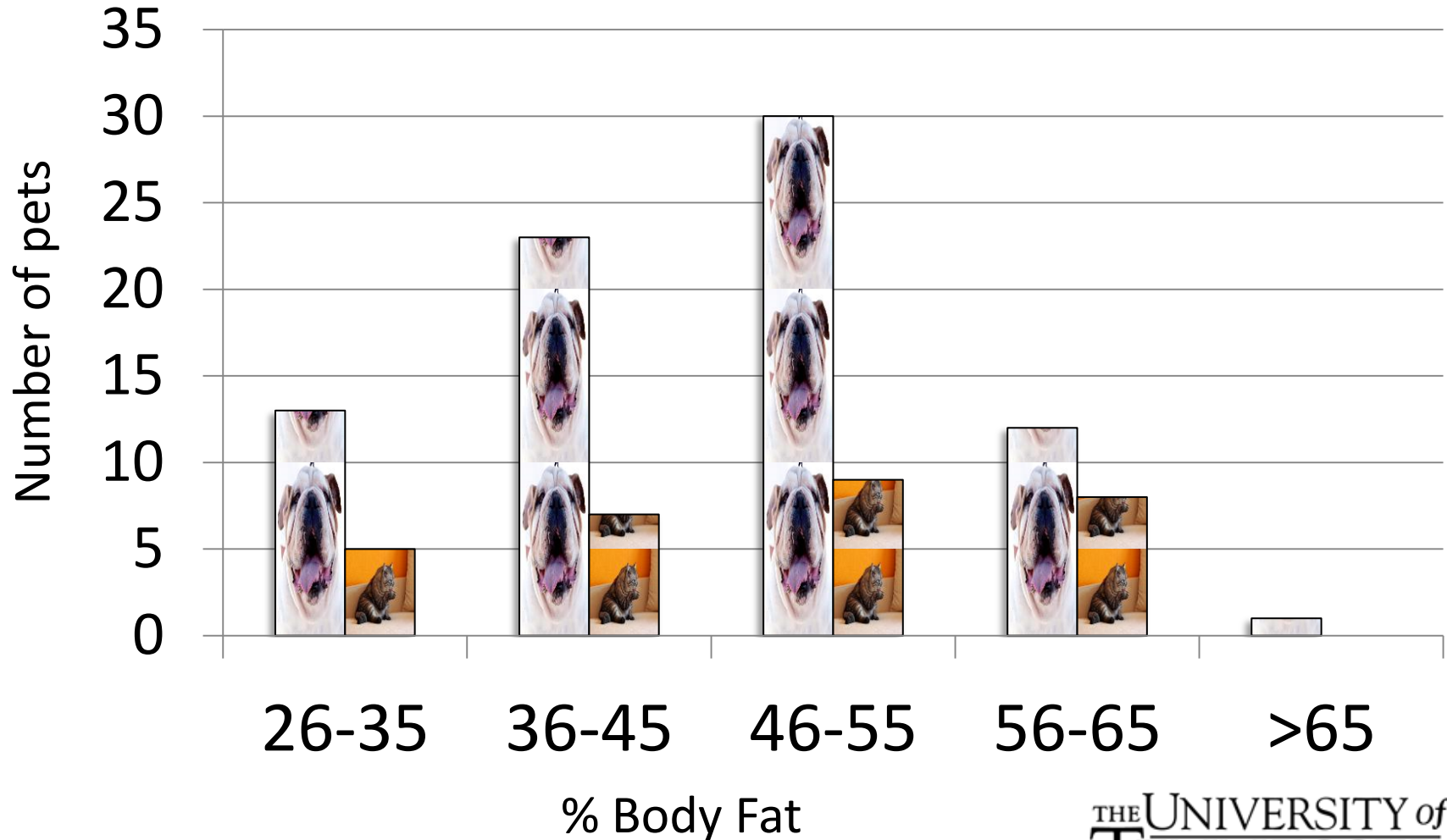
Seventy six client owned cats:

Age: Range: 1 to 15 years, Average 6 years
Gender: 38 females (0 intact), 38 males (1 intact)
Body Fat: Range: 25% to 62%, Average: 46%
Weight: Range 6.2 to 25.3 lbs, Average: 13.5 lbs
Breed:

54 DOMESTIC SHORT HAIR, 14 DOMESTIC LONG HAIR, 2 BURMESE, 1 ABYSSINIAN/SOMALI, 1 AMERICAN SHORTHAIR, 1 DEVON REX, 1 SHOWSHOE, 1 SINGAPURA, 1 OTHER.



Distribution of Pets based on DEXA determined Percent Body Fat



Diagnostic Tests to assess Body Composition

DEXA = Gold Standard

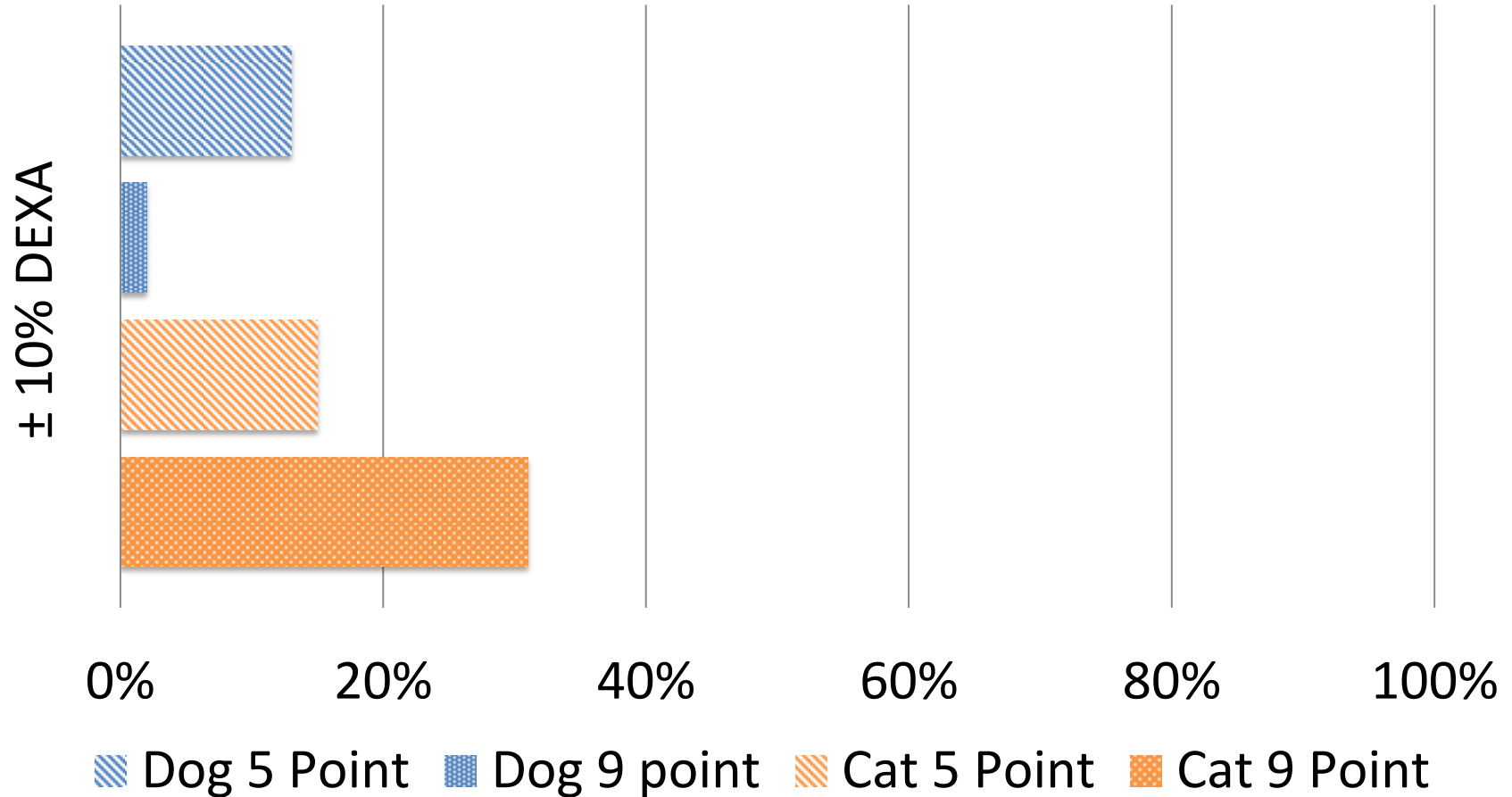


☐ Morphometric Measurements

☐ BFI Risk Chart

☐ Traditional BCS

Accuracy of Predicting Ideal Weight with Traditional BCS Compared to DEXA



Diagnostic Tests to assess Body Composition

DEXA = Gold Standard









☐ Morphometric Measurements

☐ BFI Risk Chart

☐ Traditional BCS

BFI Risk Chart is **Validated** in dogs and cats with **> 50% Body Fat**

Hill's BFI Risk Chart

20	15-25% Body Fat	30	25-35% Body Fat	40	35-45% Body Fat	50	45-55% Body Fat	60	55-65% Body Fat	70	65-75% Body Fat
											
Low Risk		Mild Risk		Moderate Risk		Serious Risk		Severe Risk		Extreme Risk	
Face Minimal fat cover. Prominent bony structures. Head & Neck Prominent distinction between head & shoulder. Loose scruff. No scruff fat. Sternum Prominent. Very easy to palpate. Minimal pectoral fat. Scapula Prominent. Very easy to palpate. Ribs Prominent. Very easy to palpate. Abdomen Loose abdominal skin. Easy to palpate abdominal contents. Tail Base Prominent bony structure. Easy to palpate. Minimal fat cover. Shape From the Side Moderate to slight abdominal tuck. Shape From Above Marked hourglass.		Face Slight fat cover. Defined bony structures. Head & Neck Clear distinction between head & shoulder. Loose scruff. Slight scruff fat. Sternum Defined, slightly prominent. Easy to palpate. Slight to moderate pectoral fat. Scapula Defined, slightly prominent. Easy / Very easy to palpate. Ribs Not prominent. Easy to palpate. Abdomen Loose abdominal skin with minimal fat. Easy to palpate abdominal contents. Tail Base Slightly to minimally prominent bony structure. Palpable. Slight fat cover. Shape From the Side No abdominal tuck. Shape From Above Slight hourglass / Lumbar waist.		Face Slight to moderate fat cover. Defined to slight bony structures. Head & Neck Clear to slight distinction between head & shoulder. Loose to snug scruff. Slight to moderate scruff fat. Sternum Minimally prominent. Palpable. Moderate pectoral fat. Scapula Slightly prominent. Easy to palpate. Ribs Not prominent. Palpable. Abdomen Obvious skin fold with moderate fat. Easy to palpate abdominal contents. Tail Base Minimally prominent bony structure. Palpable. Slight to moderate fat cover. Shape From the Side Slight abdominal bulge. Shape From Above Lumbar waist.		Face Moderate fat cover. Slight to minimal bony structures. Head & Neck Minimal distinction between head & shoulder. Loose to snug scruff. Moderate scruff fat. Sternum Poorly defined. Difficult to palpate. Thick pectoral fat. Scapula Minimally to not prominent. Palpable. Ribs Not prominent. Difficult to palpate. Abdomen Heavy fat pad. Difficult to palpate abdominal contents. Tail Base Poorly defined bony structure. Difficult to palpate. Moderate to thick fat cover. Shape From the Side Moderate abdominal bulge. Shape From Above Broadened back.		Face Thick fat cover. Minimal to no bony structures. Head & Neck Poor to no distinction between head & shoulder. Snug to tight scruff. Very thick scruff fat. Sternum Not prominent. Extremely difficult to palpate. Extremely thick pectoral fat. Scapula Not prominent. Difficult to palpate. Ribs Not prominent. Extremely difficult to impossible to palpate. Abdomen Very heavy fat pad; indistinct from abdominal fat. Impossible to palpate abdominal contents. Tail Base Bony structure not prominent. Very difficult to palpate. Very thick fat cover. Shape From the Side Severe abdominal bulge. Shape From Above Severely broadened back.		Face Very thick fat cover. No bony structures. Head & Neck No distinction between head & shoulder. Tight scruff. Very thick scruff fat. Sternum Not prominent. Impossible to palpate. Extreme pectoral fat. Scapula Not prominent. Impossible to palpate. Ribs Not prominent. Impossible to palpate. Abdomen Extremely heavy fat pad; indistinct from abdominal fat. Impossible to palpate abdominal contents. Tail Base Bony structure not prominent. Extremely difficult to palpate. Extremely thick fat cover. Shape From the Side Very severe abdominal bulge. Shape From Above Extremely broadened back.	



Directly links excess body fat (BFI) to the increased health risks.

Hill's BFI Risk Chart

20	15-25% Body Fat	30	25-35% Body Fat	40	35-45% Body Fat	50	45-55% Body Fat	60	55-65% Body Fat	70	65-75% Body Fat
Low Risk		Mild Risk		Moderate Risk		Serious Risk		Severe Risk		Extreme Risk	
Ribs Slightly prominent. Easily felt. Thin fat cover. Shape From Above Well proportioned lumbar waist. Shape From the Side Abdominal tuck present. Shape From Behind Clear muscle definition, smooth contour. Tall Base Bones Slightly prominent. Easily felt. Tall Base Fat Thin fat cover.		Ribs Slightly to not prominent. Can be felt. Moderate fat cover. Shape From Above Detectable lumbar waist. Shape From the Side Slight abdominal tuck. Shape From Behind Losing muscle definition, rounded appearance. Tall Base Bones Slightly to not prominent. Can be felt. Tall Base Fat Moderate fat cover.		Ribs Not prominent. Very difficult to feel. Thick fat cover. Shape From Above Loss of lumbar waist, broadened back. Shape From the Side Flat to bulging abdomen. Shape From Behind Rounded to square appearance. Tall Base Bones Not prominent. Very difficult to feel. Tall Base Fat Thick fat cover. May have a small fat dimple.		Ribs Not prominent. Extremely difficult to feel. Very thick fat cover. Shape From Above Markedly broadened back. Shape From the Side Marked abdominal bulge. Shape From Behind Square appearance. Tall Base Bones Not prominent. Extremely difficult to feel. Tall Base Fat Very thick fat cover. Fat dimple or fold present.		Ribs Not prominent. Impossible to feel. Extremely thick fat cover. Shape From Above Extremely broadened back. Shape From the Side Severe abdominal bulge. Shape From Behind Square appearance. Tall Base Bones Not prominent. Impossible to feel. Tall Base Fat Extremely thick fat cover. Large fat dimple or fat fold.		Ribs Unidentifiable. Impossible to feel. Extremely thick fat cover. Shape From Above Extremely broadened back, bulging mid-section. Shape From the Side Very severe abdominal bulge. Shape From Behind Irregular or upside down pear shape. Tall Base Bones Unidentifiable. Tall Base Fat Extremely thick fat cover. Large fat folds or pads.	



BFI Risk Chart associates body composition with risk

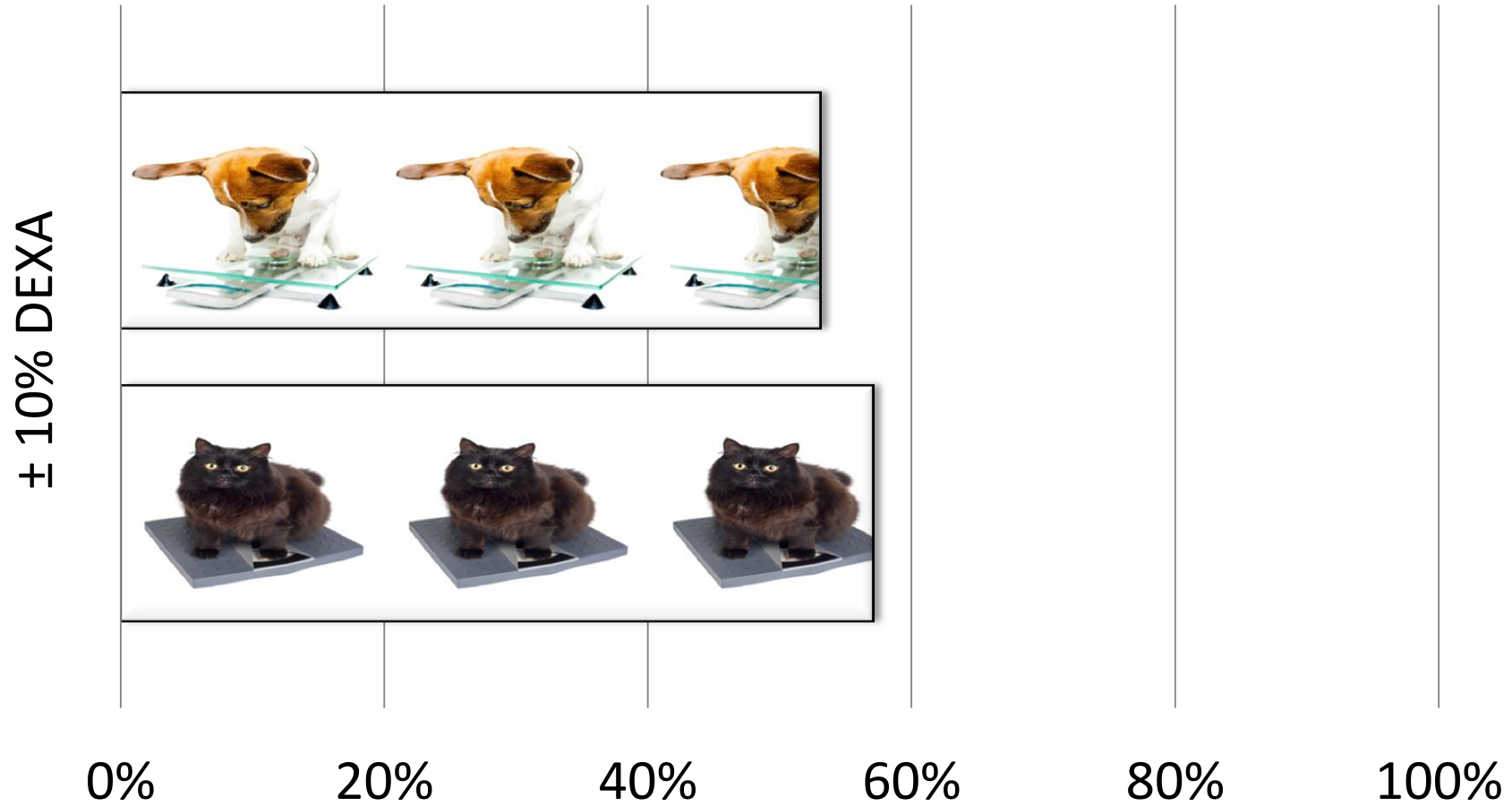
Traditional BCS Validated for pets with **< 50% Body Fat** and uses **stigmatized language** to communicate

Discuss **RISK** not weight

5 Point BCS	% Body Fat	9 Point BCS	% Body Fat
3	16-25	5	11-27
4	25-35	6	28-32
5	36-45	7	33-38
		8	38-44
		9	45-47

BFI Risk Chart	% Body Fat	Risk
20	16-25	Normal
30	25-35	Moderate
40	36-45	High
50	46-55	Serious
60	56-65	Severe
70	66-75	Extreme

Accuracy of Predicting Ideal Weight with BFI Risk Chart Compared to DEXA



Diagnostic Tests to assess Body Composition

DEXA = Gold Standard



☐ Morphometric Measurements

☐ BFI Risk Chart

☐ Traditional BCS

Simple Body Measurements using a tailors tape ~ 2 mins

4 Measurements

6 Measurements

1 Cranial length
Measure from the level of the medial canthus equidistant between the eyes to the external occipital protuberance.



Medial canthus (eye)

2 Head circumference
Measure circumference by placing tape equidistant between the eyes and ears at the widest part of the head.



Dorsal occipital (back of head)

3 Front leg length
Measure from the proximal edge of the central foot pad to the point of the elbow (olecranon process). Carpus must be straight.



4 Hind leg length
Measure from the proximal edge of the central foot pad to the tip of the hock (dorsal tip of the calcaneal process). Tarsus must be straight.



5 Head circumference
Measure circumference by placing the tape equidistant between the eyes and ears at the widest part of the head.



Head

6 Thoracic circumference
Measure the girth at the level of the heart (< 6th - 7th ribs, just behind elbows).



7 Front leg circumference
Measure circumference at the midpoint between the carpus and the elbow.



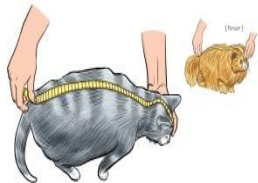
8 Front leg length
Measure from the proximal edge of the central foot pad to the point of the elbow (olecranon process). Carpus must be straight.



9 Hind Leg Length
Measure from the proximal edge of the central foot pad to the tip of the hock (dorsal tip of the calcaneal process). Tarsus must be straight.

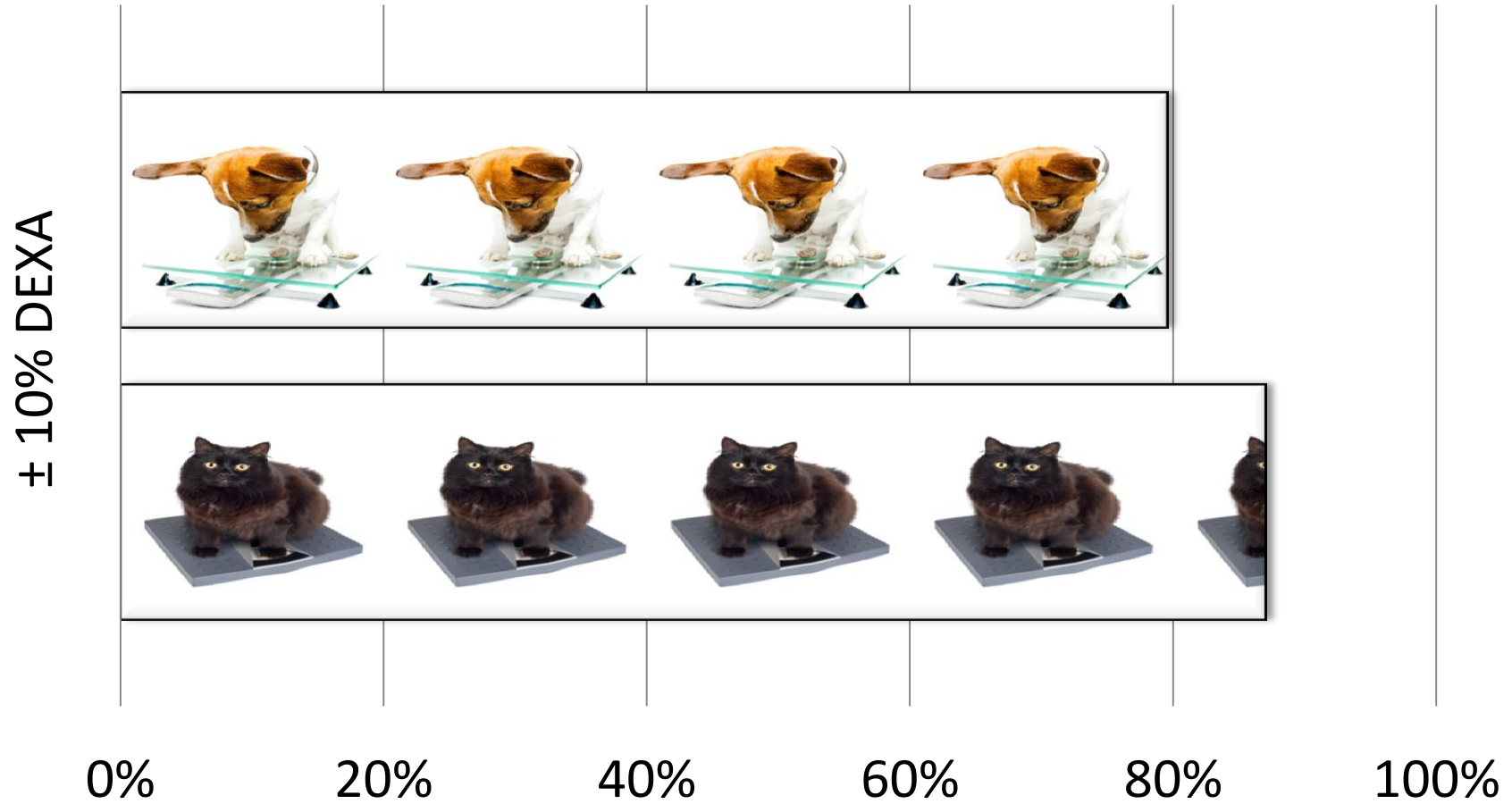


10 Body Length
Starting from the base of the tail, measure along the dorsal midline following the contours of the back, neck and head to the proximal edge of the nose pad.

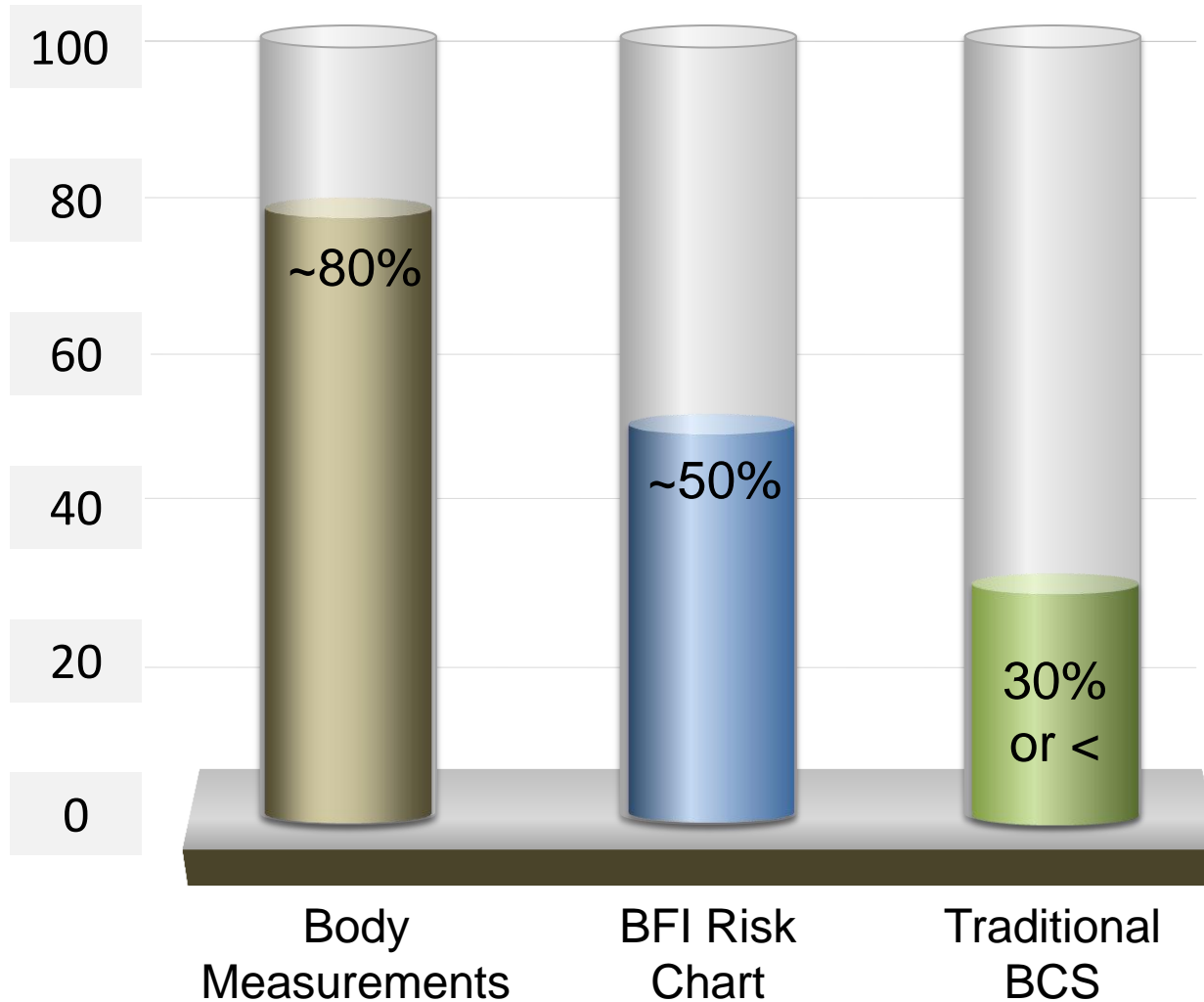


(nose)

Accuracy of Predicting Ideal Weight with Body Measurements Compared to DEXA



Relative Accuracy of Predicting Ideal Weight



Healthy Weight Protocol

Diagnostic Tools



To determine **ideal body weight** in **overweight** pets

Overweight BCS > 3/5 or 5/9 BCS



Healthy weight
protocol tools

Morfometric
measurements

BFI assesment
tool

Discuss with owner BFI risk
chart

Feeding recommendation

Morphometric measurements

- Validate only for overweight and obese patients.
- For dogs from 5kg to 73 kg
- For cats from 3 kg to 11.5 kg
- Not enough information for pets outside of that range.

How to perform measurements?

- A series of body frame (morphometric) measurements are taken using a flexible tape measure
- **Canine Measurements (1/4) :**



Head Length

Measure from the external occipital protuberance to the point equidistant between the eyes

Canine Measurements 2/4 :



Front Leg Length

Measure the length from top of the central foot pad to elbow. Carpus must be straight.

Canine Measurements 3/4:



Head circumference

Measure between the eyes and the ears at the widest part of the head

Canine Measurements 4/4:



Hind Leg Length

Measure the length of the hind leg from the top of the central foot pad to the dorsal tip of the calcaneal process

Ready for the cat?



Feline Measurements 1/6



Head circumference

Wrapping tape snugly, measure between the eyes and the ears at the widest part of the head.

Feline Measurements 2/6



Thoracic circumference

Wrap tape snugly
around rib cage at the
heart girth (behind
elbow)

Feline Measurements 3/6



Front Leg Circumference

Wrap tape snugly around front leg at the midpoint between the carpus and the elbow

Feline Measurements 4/6



Front Leg Length

Measure the length from top of the central foot pad to the point of the elbow. Carpus must be straight.

Feline Measurements 5/6



Hind Leg Length

Measure the length of the hind leg from the top of the central foot pad to the dorsal tip of the calcaneal process.

Feline Measurements 5/6



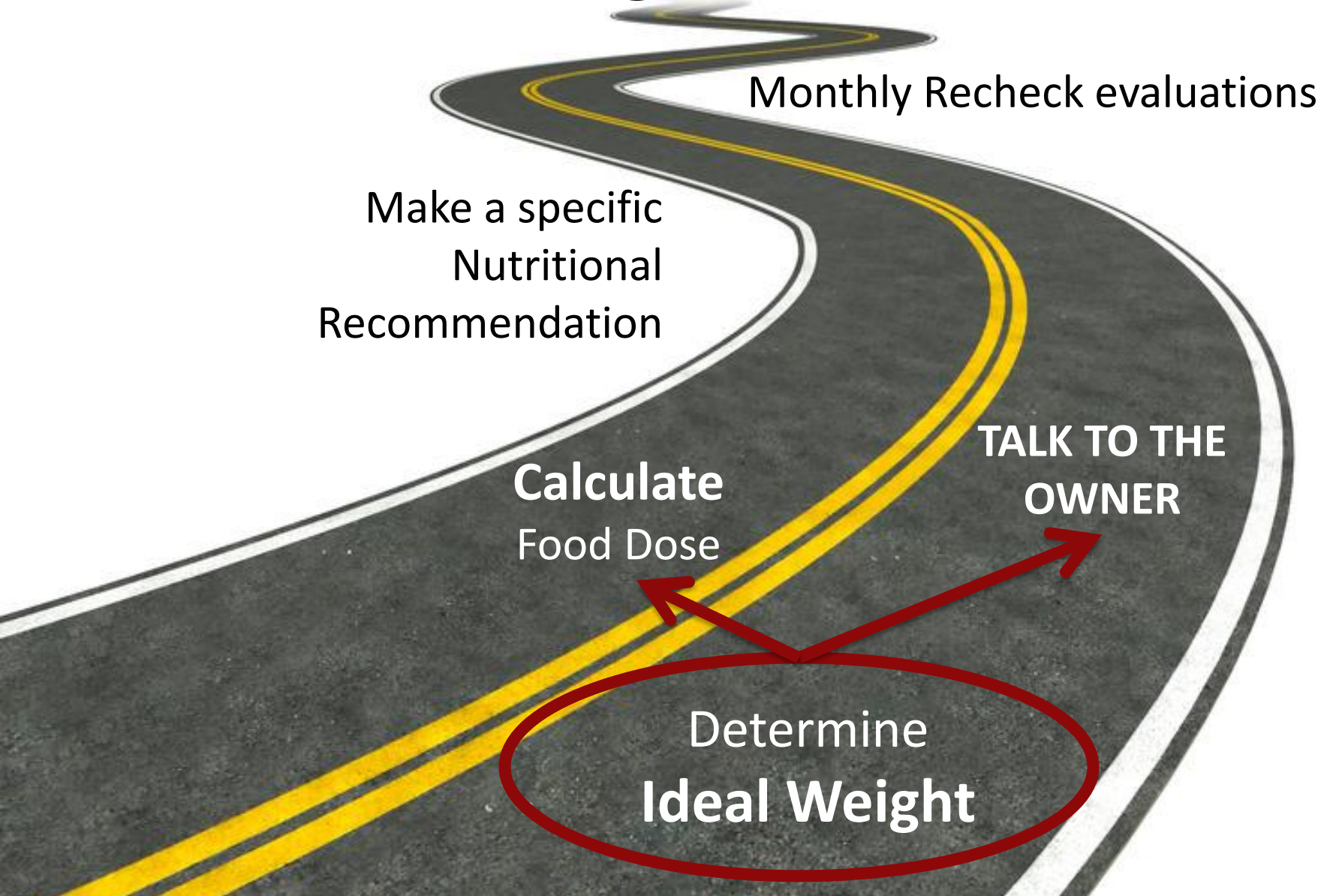
Body Length

Measure from the tip of the nose to the base of the tail where it meets the body. Hold tape gently along the dorsal midline.

Video



Road to Weight Loss Success



Thank you



HILL'S
HEALTHY WEIGHT
PROTOCOL

References HWP

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- Lusby AL, Kirk CA, Toll PW, et al. Effectiveness of BCS for Estimation of Ideal Body Weight and Energy Requirements in Overweight and Obese Dogs Compared to DXA (abstract). *Journal of Veterinary Internal Medicine* 2010;24:717.

- **EFFECTIVENESS OF MORPHOMETRIC MEASUREMENTS FOR PREDICTING BODY COMPOSITION IN OVERWEIGHT AND OBESE DOGS.** PW Toll,¹ I Paetau-Robinson¹, AL Lusby,² GA Henry,² CA Kirk,²
1. Hills Pet Nutrition, Topeka, KS 2. University of Tennessee Department of Small Animal Clinical Sciences, Knoxville, TN
- In a prior study we demonstrated that current methods of estimating ideal body weight for weight loss feeding are inaccurate in dogs having > 45% body fat. The purpose of this study was to develop simple and accurate methods of measuring body composition in clinical practice in overweight to morbidly obese dogs. Current morphometric measurement methods do not adequately predict body composition in obese dogs. Additionally, these methods tend to be difficult to use and have poor accuracy. This study evaluated two methods of predicting lean body mass (LBM) from animal morphology, radiographic measurement of skeletal size and external physical measurement of body size.
- Thirty-six client-owned overweight or obese adult dogs (28% to 64% body fat) weighing 5 to 73.6 kg underwent dual energy x-ray absorptiometry (DXA) scanning to assess their body composition. Nine measurements were made from digital radiographs to assess skeletal size and 16 external physical measurements were made to assess body size. Body weight was also measured. Multiple regression analysis using DXA results as the dependent variable was used to develop regression equations for the prediction of LBM from the skeletal size and body size data. Several equations were developed that had high (>0.9) correlation coefficients for both methods when the dogs were divided into 2 size groups (≤ 40 lbs and > 40 lbs). The best equations were applied to the data from the same group of dogs to evaluate how well values for individuals were predicted (within $\pm 10\%$ of the DXA value). The best equations using skeletal size data resulted in a $r^2 = 0.99$ and a predictability ($\pm 10\%$) $\geq 86\%$ using ≤ 8 variables (including BW) for both size groups. The best equations using body size data resulted in a $r^2 = 0.99$ and a predictability ($\pm 10\%$) = 100% using ≤ 8 variables (including BW and age) for both size groups.
- Multiple regression analysis demonstrated that both methods could be used to predict LBM using a variety of regression equations. This approach shows great potential for the development of simple and accurate tools to be used in clinical practice. Further studies must be done to validate the equations in a population of dogs other than those used to develop the equations.

EFFECTIVENESS OF BCS FOR ESTIMATION OF IDEAL BODY WEIGHT AND ENERGY REQUIREMENTS IN OVERWEIGHT AND OBESE DOGS COMPARED TO DXA. AL Lusby,¹ CA Kirk,¹ PW Toll,² I Paetau-Robinson² 1. University of Tennessee Department of Small Animal Clinical Sciences, Knoxville, TN 2. Hills Pet Nutrition, Topeka, KS

With an estimated 35-40% of pet dogs being overweight or obese, veterinarians must accurately assess energy needs to prescribe appropriate food doses. Body condition scoring (BCS) is the most popular and accessible method for estimating degrees of obesity in dogs, but these scales were designed to assess animals with body fat percentages below about 45%. Many obese dogs have body fat percentages of 50% and greater. This project compared the accuracy of using body fat percentages to the 5 and 9 point BCS systems for estimating ideal body weight and resting energy requirements (RER) in overweight dogs. Thirty-six healthy, client-owned dogs ranging from 5 to 73.6 kg underwent dual energy x-ray absorptiometry (DXA) scanning to assess their percentage of body fat (BF). BF percentage was then used to estimate ideal body weight, calculate RER, and classify each animal into the 5 and 9 point BCS system. Once a BCS was assigned, the median body fat percentage for each score was used to estimate ideal body weight and RER (5 point scale - 4=30%, 5=40%; 9 point scale - 6=30%, 7=35%, 8=40%, 9=45%). Based on DXA, body fat ranged from 28.3% to 63.7% with a mean of 45.9%. To assess the accuracy of BCS for moderately versus morbidly obese dogs, patients were divided into two groups: <45% body fat (n=15) and >45% body fat (n=21). Compared to DXA, estimations of ideal body weight were significantly higher using the 5 (23.0 vs. 19.2 kg) and 9 (21.1 vs. 19.2 kg) point BCS in dogs with BF >45% (p<0.001) but did not differ in dogs with <45% BF (p>0.05). DXA estimations of RER were also significantly lower than estimations using the 5 (709 vs. 616 Kcal/day) and 9 (665 vs. 616 Kcal/day) point scales in dogs with BF>45% (p <0.001), but did not differ in dogs with <45% BF (p>0.05). The results of this study demonstrate current BCS systems provide good estimates of ideal body weight and RER in dogs with less than 45% BF, but are inadequate for calculating RER and ideal body weight in morbidly obese dogs (BF>45%). As a result, food dose calculations will be overestimated and this may affect weight loss efficacy. As canine obesity rates climb, we must develop new methods to assess our most obese patients and provide better weight management.