ASSESSMENT OF NUTRITIONAL HEALTH & WELFARE

NAG 2019

ANIMAL WELFARE

AZA Standard 1.5.0:

The institution must have a [written] process for assessing animal welfare and wellness.

AZA Accreditation Standards

Animal welfare/wellness refers to an animal's collective physical and mental states over a period of time, and is measured on a continuum from good to poor.

AZA Animal Welfare Committee

5 FREEDOMS

- **Freedom from hunger and thirst**
- Freedom from discomfort
- Freedom from pain, injury or disease
- Freedom to express normal behavior
- Freedom from fear and distress

Farm Animal Welfare Council 1979

5 OPPORTUNITIES

- **Opportunity for a well-balanced diet**
- Opportunity to self-maintain
- Opportunity for optimal health
- Opportunity to express species-specific behavior
- Opportunities for choice and control

Vicino and Miller 2013

5 DOMAINS

- **Nutrition**
- Environment
- Physical Health
- Behavior
- Mental or Affective States

Mellor and Beausoleil 2015

Welfare as a continuum?
(eg FAWC (2009) vs. Veissier & Boissy (2007))

Good welfare

A good life
mainly positive experiences
and emotions

Adequate welfare

A life worth living
minimal suffering

Poor welfare

A life not worth living
all suffering

ASSOCIATION OF ZOOS & AQUARIUMS

"Welfare is best assessed as a combination of **inputs** and **outputs**.

Inputs are the resources, facilities, processes and practices that contribute to the animal's overall experience.

Outputs are what the animal actually experiences and should be measured from the perspective of the animal itself (or the group's perspective)"

TOOLKIT

Provide a bank of assessments that can be chosen to suit the situation at hand

- New animal evaluation
- Keeper daily data
- Clinical evaluation
- Welfare assessment

WORKSHOP GOAL:

We will create a toolkit that can be drawn from to formally and informally evaluate the nutritional welfare of animals

TODAY'S PLAN...

MORNING

- Introduction
- Inputs:
  - Assessing Safety
  - Assessing Feeds
  - Assessing Diets
- Outputs
  - Assessing Intake
  - Assessing Feeding Behavior
  - Physical Assessments
- Wet-lab (Part 1)

LUNCH

- Provided!
- In this room!

AFTERNOON

- Wet-lab (Part 2)
- Outputs
  - Chemical Assessments
- Developing the toolkit

Data Loggers: Elitech RC-51 USB Temperature Data Logger "Pen Style"

Setup

1) Make a logbook of all the different areas and/or delivery containers in your park. Randomize the list. Set up a datasheet like below:

Area	Logger #	Date OUT	Date/Time Fed	Temp in range
Myombe				
Cheetahs				
Jungala				
Lower Aviary				

2) Designate a bin or location in the NC for keepers to drop off loggers. Make sure everyone on kitchen staff knows where it is so they can point people to it.

Prepare loggers.

1) Print data cards (page 2 of this document) on 4x6 index cards using the "envelope setting" of your printer.
2) For each logger, fill out the NC portion of the data card
3) Start logger (long-press the soft button)
4) Place logger, instructions, and data card into plastic baggie. Place in delivery bucket.

Once loggers return:

1) Plug logger into computer, open DL software.
2) View graph and note how many times and for how long the graph was in the red zone. Identify problems in the logbook.
3) Record details from data card/computer into the logbook.
4) Save logger graph
5) Clear logger data
6) Share data with animal teams and discuss modifications.

Area	Logger #	Date OUT	Date/Time Fed	Temp in range
Myombe	52	Sep 18, 8 am	Sep 19, 8 am	Y
Cheetahs	88	Sep 18, 9:15 am	Sep 18, 3 pm	1 hr at 62 F
Jungala	62	Sep 18, 10:10 am	Sep 18, 7 pm	1 min at 98 F(!!)
Lower Aviary	56	Sep 18, 11 am	Sep 19, 4 pm	Y

7) Repeat until all areas have been tested. Continue repeating for duration of heat wave/summer/training period.

Keep with food until
you feed your animal.

Date Animal Fed:_____

Time Animal Fed: __:__AM/PM

Keeper Name: _____

Keep with food until
you feed your animal.

Date Animal Fed:_____

Time Animal Fed: __:__AM/PM

Keeper Name: _____

Using Glo Germ powder to teach about proper handwashing, cleaning, and food cross-contamination

From: https://www.glogerm.com/handwashing.html

Handwashing Training

1. Shake the bottle of GloGerm oil well and place a small amount, about the size of a quarter, into the palm of one hand and spread over both hands completely as if applying hand lotion. Be sure to cover hands completely, particularly under nails, around cuticles and between fingers. Wipe off excess with paper towel. Do not let oil contact clothing as staining may result. When using white Glo Germ gel, use same procedure with a pad of gel about the size of a nickel. Wiping off excess is usually not necessary.
2. Place hands under UV lamp to view "glowing germs" that exist before hand washing. Demonstration works best in a darkened room.
3. Perform the FDA-recommended hand wash using soap and warm water. The amount of effort required to remove the simulated germs is equal to that of removing most bacteria.
4. Again, place hands under UV lamp, paying special attention to thumbs, areas around nails and between fingers, The UV lamp reveals the remaining "germs" as proof of improper hand washing.
5. Complete removal of Glo Germ with normal washing is more difficult if skin is chapped or cracked, indicating that bacteria is also harder to remove. This will require a hand care regime with a quality lotion twice daily and a judicious use of a hand sanitizing gel.

Surface Cleaning

1. Lightly dust a small amount of Glo Germ powder over an entire surface area.
2. Clean the surface until all visible powder disappears.
3. Pass the UV lamp over the surface; the remaining traces of powder will glow on the areas that weren't washed thoroughly. When checking restroom areas for cleanliness, UV lamp may be used for the detection of urine without using Glo Germ powder.

Food Cross-Contamination

1. Sprinkle powder very lightly over a head of lettuce, tomato or another fruit or vegetable to be processed by trainees so that powder is not visible in ordinary light. Food used is to be discarded after demonstration.
2. Have trainee's process food using their normal procedure and kitchen utensils.
3. Use UV lamp to show how the "glowing germs" are spread to hands, cutting boards, knives and to other foods.

SEAWORLD PARKS & ENTERTAINMENT

NUTRITIONAL GOALS WORKSHEET

House Name	House Name	**Species**	Species
ID #	ID	**Location**	Location
Date	Date	**Attendees**	People involved
Current Wt.	Wt + Units	**Age & Sex**	Age & Sex

BEHAVIORAL GOALS (TRAINING, ENRICHMENT, INTERACTIONS)

Click here to enter text.

MEDICAL & DENTAL GOALS

Click here to enter text.

BODY WEIGHT, BODY CONDITION & EXERCISE GOALS

Click here to enter text.

GROWTH & REPRODUCTIVE GOALS

Click here to enter text.

INDIVIDUAL NEEDS & PREFERENCES

Click here to enter text.

NUTRITIONAL GOALS

Model taxa: Related taxa with published nutrient requirements.

Nutrient targets based on above goals:

Kcal: Target	**Fiber:** Target	**Other:** Target
Protein: Target	**Sugar:** Target	**Other:** Target

COORDINATED DIET PLAN

Click here to enter text.

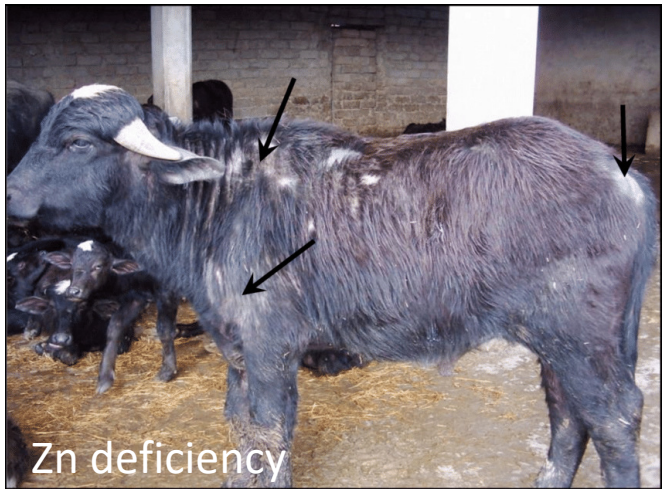
Physical Assessment of the Nutritional Status of Animals

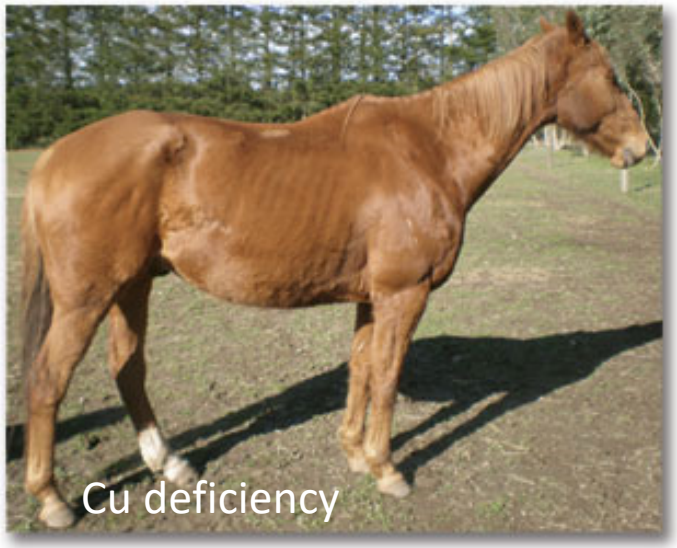
Heidi Bissell, PhD

Busch Gardens Tampa

What are indicators of good (or poor) nutritional status in animals?

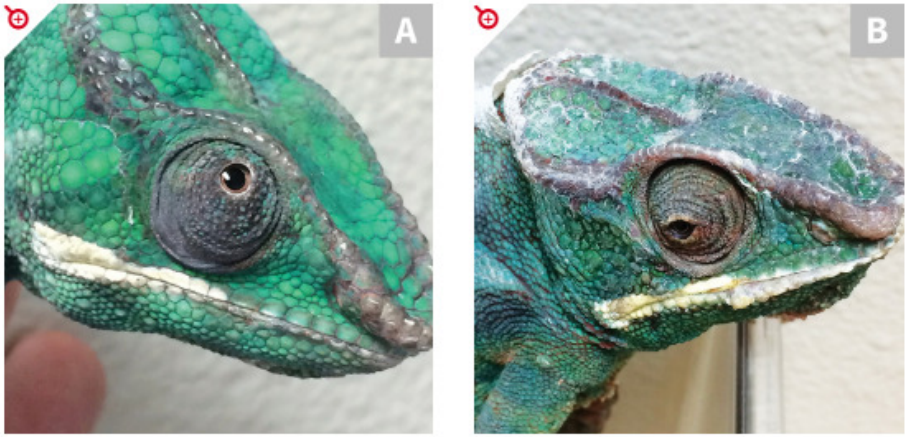
Color & Texture





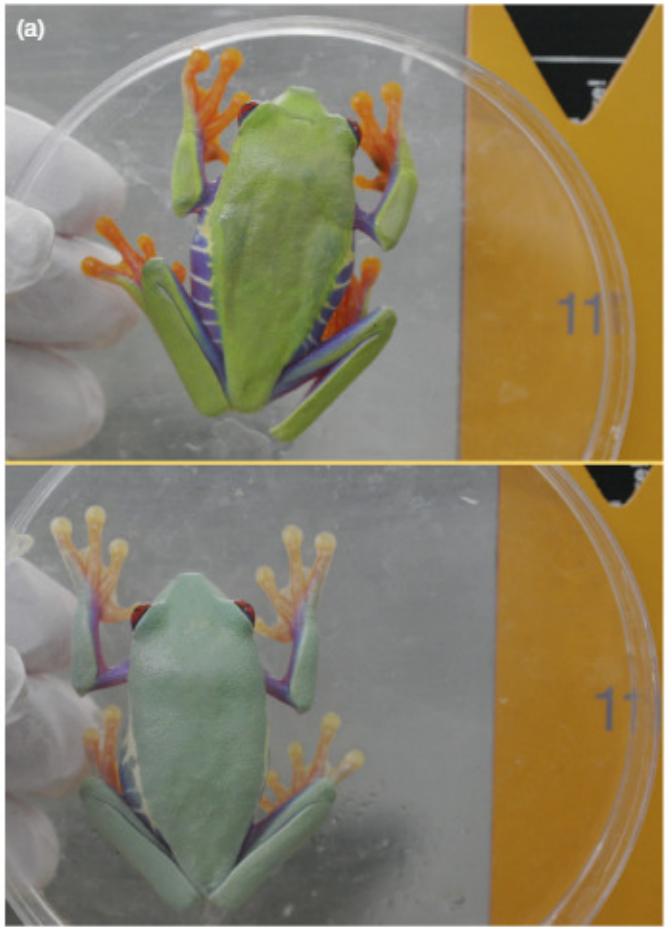
Color & Texture

Vitamin A: Dryness, colors not vibrant, ocular concerns



▲ **FIGURE 1** Healthy panther chameleon (*Furcifer pardalis*; **A**) with clear rounded eyelids as compared with a panther chameleon with vitamin A deficiency (**B**). Dull coloration, cheilitis, blepharedema, squinting, mucoid ocular buildup, and dysecdysis are visible over the head and eyelid openings.

Clinician's Brief

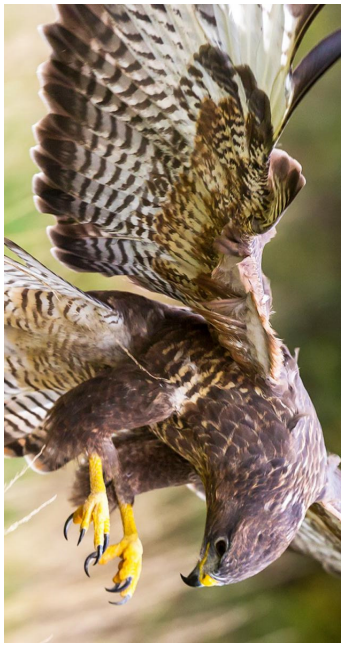


Ogilvy V, Preziosi RF, and Fidgett AL. 2012. Animal Conservation 15:480–488.

Color & Texture

Site 1: Midway between eyes

Site 2: Primary coverts nearest tail



Audubon.org; www.incredibleegg.org

What to do with color info?

Fecal evaluation

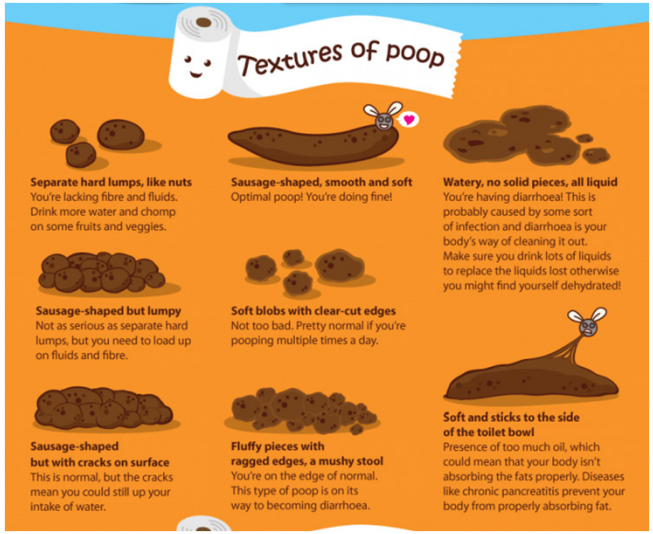
- Color
- Consistency
- Particle size
- Frequency
- Composition

Color

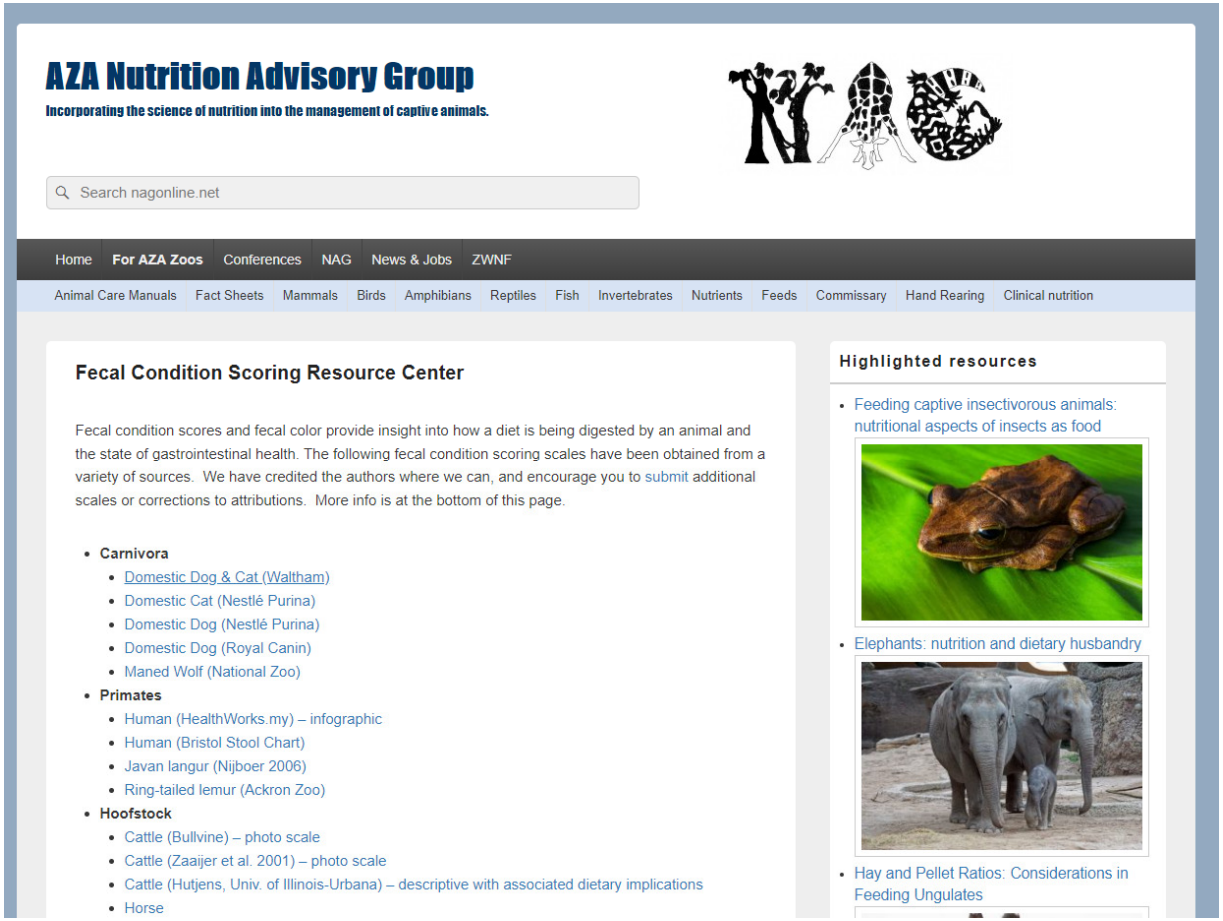

2245
2521
2686
2811
5781
5329


Shades of poop
Brown: You're fine. Poop is naturally brown due to the bile produced in your liver.
Green: Food may be moving through your large intestine too quickly. Or you could have eaten lots of green leafy veggies, or green food colouring.
Yellow: Greasy, foul-smelling yellow poop indicates excess fat, which could be due to a malabsorption disorder like celiac disease.
Black: It could mean that you're bleeding internally due to ulcer or cancer. Some vitamins containing iron or bismuth subsalicylate could cause black poop too. Pay attention if it's sticky, and see a doc if you're worried.
Light-coloured, white, or clay-coloured: If it's not what you're normally seeing, it could mean a bile duct obstruction. Some meds could cause this too. See a doc.
Blood-stained or Red: Blood in your poop could be a symptom of cancer. Always see a doc right away if you find blood in your stool.

Consistency



NAG Fecal Condition Scoring Resource Center



Frequency

Faster

- Low fiber
- High in “weird” CHOs
- Anxiety
- Microbial dysfunction

Slower

- Dehydration
- Reduced mobility(?)
- Anxiety
- Low intake

Key

- Must compare with same individual – huge individual differences

The case of the skinny rhino


Fisher Scientific Company

Composition

- Fecal fat - digestion
  - Diet too high in fat
  - Malabsorption
- Particle size
  - Dental concerns

Behavioral

The case of the grazing orangutan

Feather plucking

Conformation & Form

Bones & skeletal structure

Pyramiding – protein too high, moisture too low

Muscles, tendons, ligaments, collagen – abnormal curling, bending or stretching

B6 (pyridoxine)

https://www.merckvetmanual.com

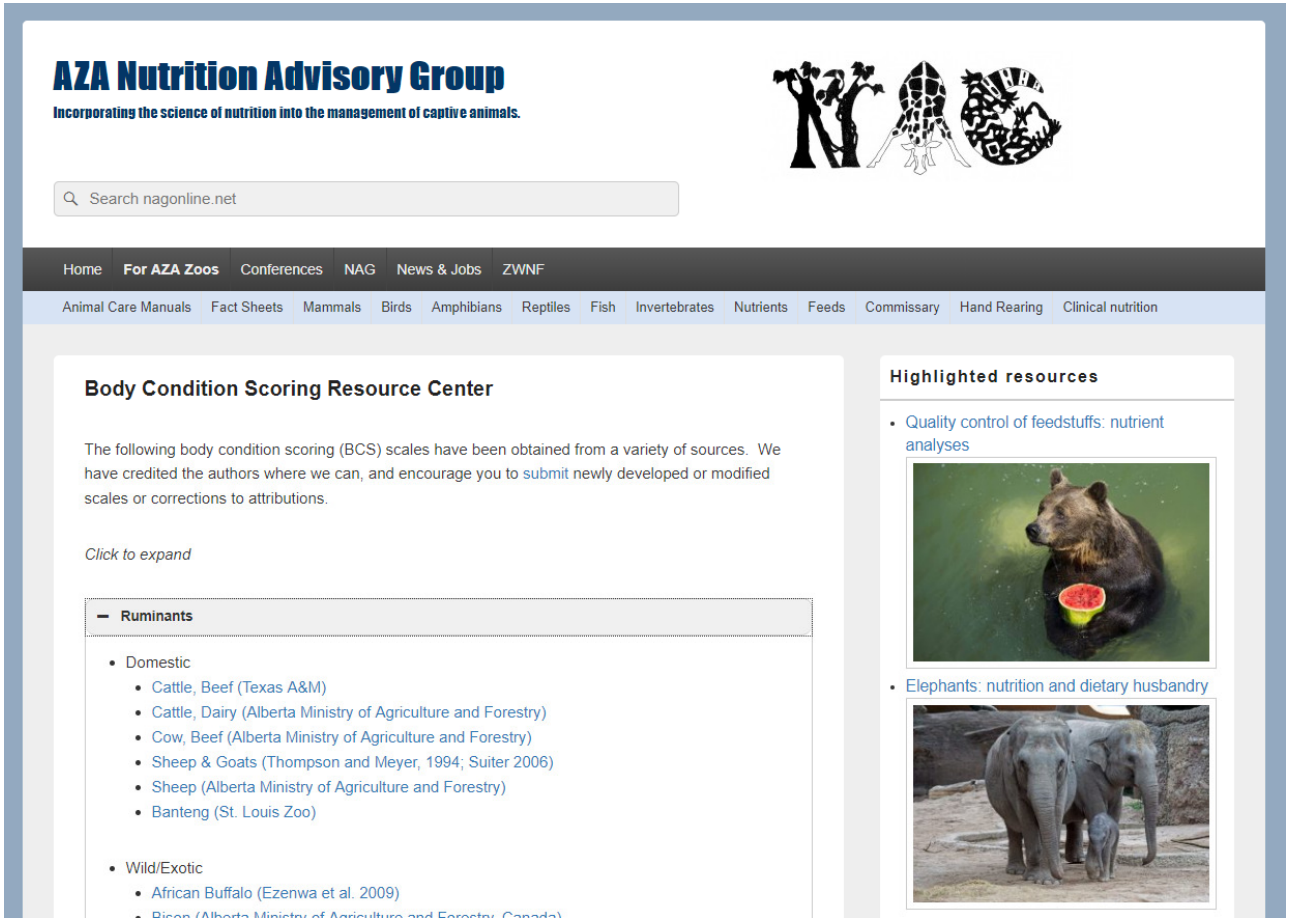
B1 (Thiamin, stargazing)

Posture: GI disorders

Conformation & Form

- **Bones** – abnormal skeletal structure
- **Muscles, tendons, ligaments, collagen** – abnormal curling, bending or stretching
- **Joints** – weakness, lameness
- **Posture** – arched back, hunched, abnormal stance
- **Body Condition – NEXT!**

NAG Body Condition Scoring Resource Center

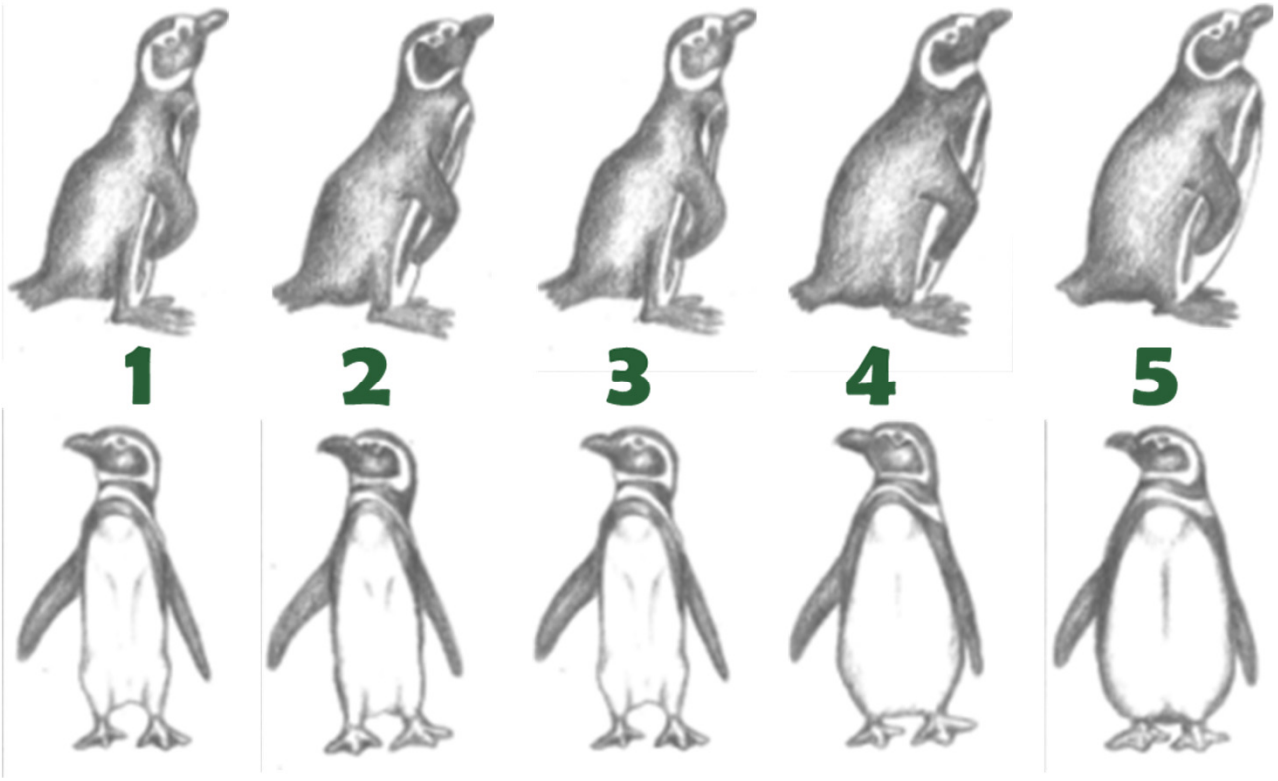


Body Condition Scoring: Penguins & Herps

Heidi Bissell, PhD

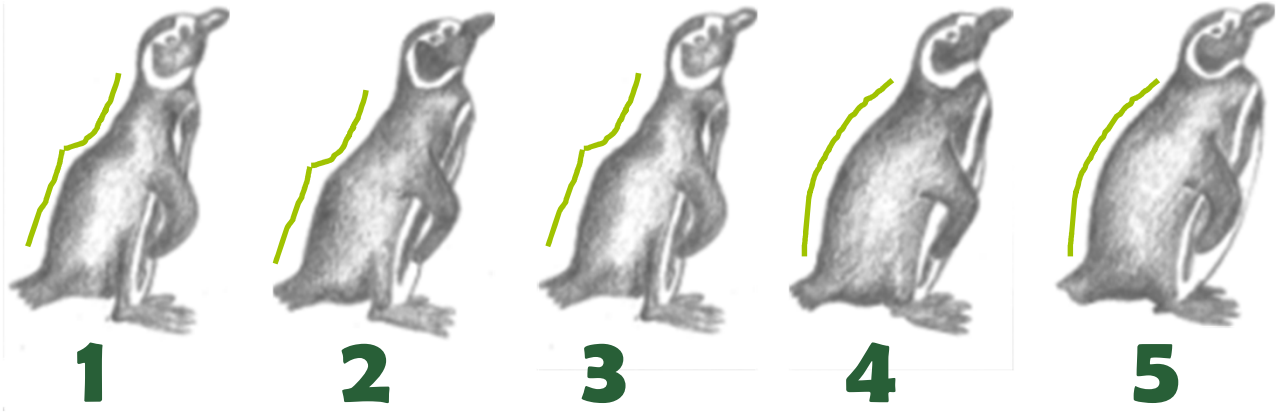
NAG/AAZV St. Louis 2019

Warm-adapted penguins



Clements J and Sanchez JN. 2015. Zoo Biol 34:538–546.

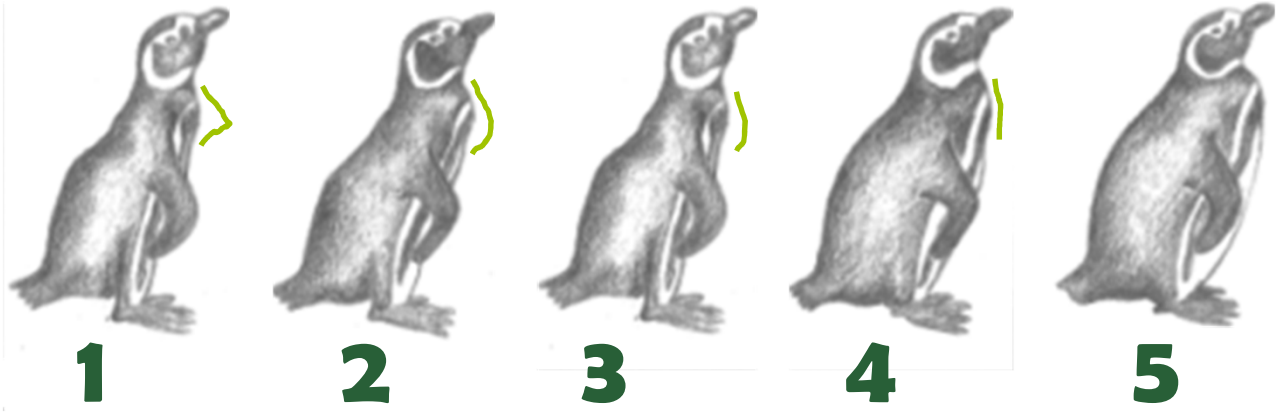
Warm-adapted penguins



1	2	3	4	5
Angular back Visible hips	Angular back Hips barely visible	Some angle to back No hips	Round back	Very round back

Do hips (“butt”) stick out?

Warm-adapted penguins



Bony furcular ridge | Rounded ridge | Smooth ridge | Minimal ridge | Fatty ridge

Does the furcular ridge (“wishbone”) stick out?

Warm-adapted penguins

1	2	3	4	5
Prominent keel	Rounded keel	Palpable, but not visible keel	Keel not palpable	Keel? What keel?

Can you feel the keel?

Warm-adapted penguins

1 **2** **3** **4** **5**

Full leg visible

Just “knees” and “ankle” visible

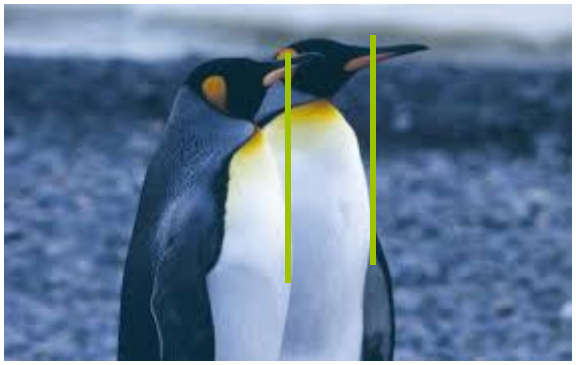
Just ankle visible

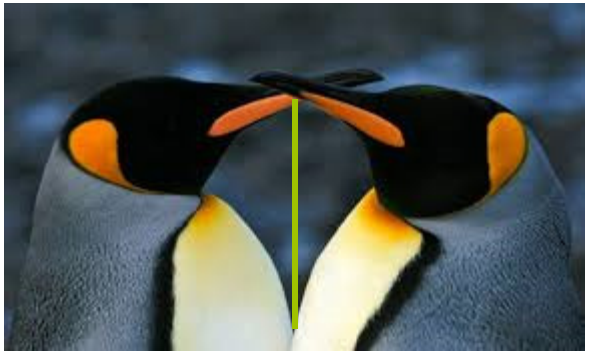
Legs? What legs

MC Hammer Pants

Cold-adapted penguins

Beak at resting angle (slightly up)

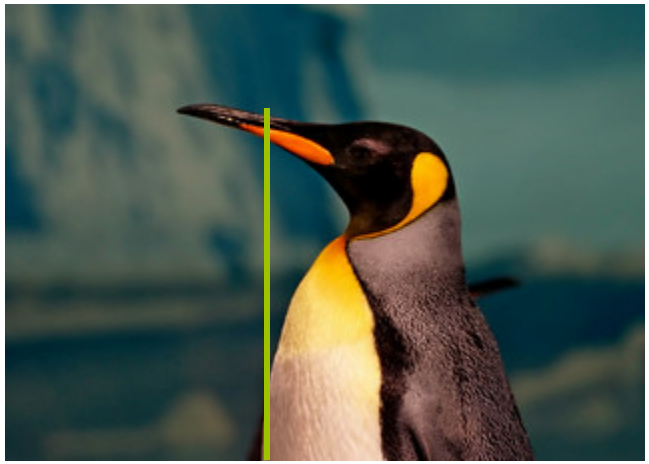




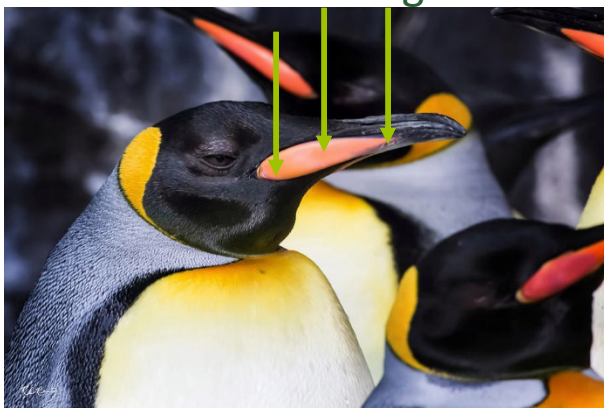
Very preliminary!!

Birds change BCS seasonally – high before molt, low after molt.

Birds change when raising chicks

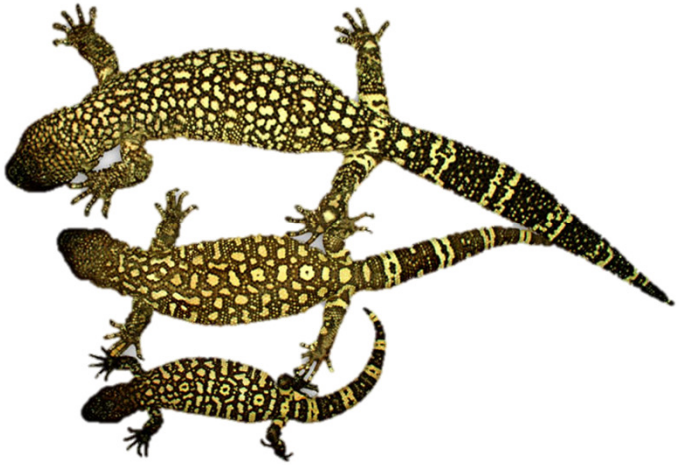


Low ok high



Lizards

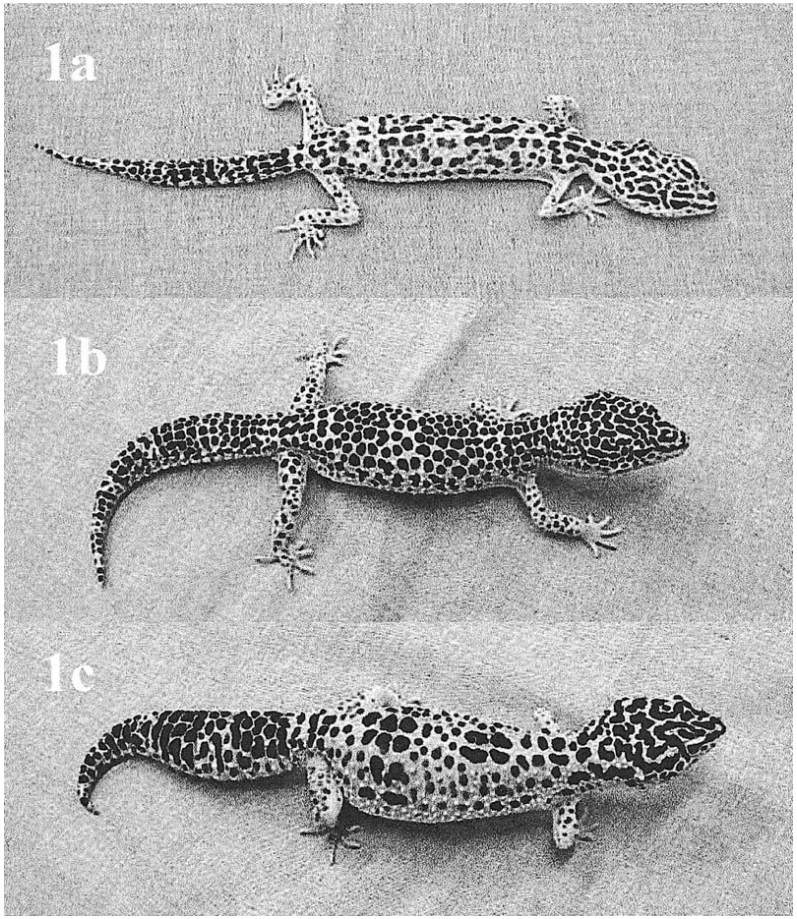
Typically store fat in belly and tail



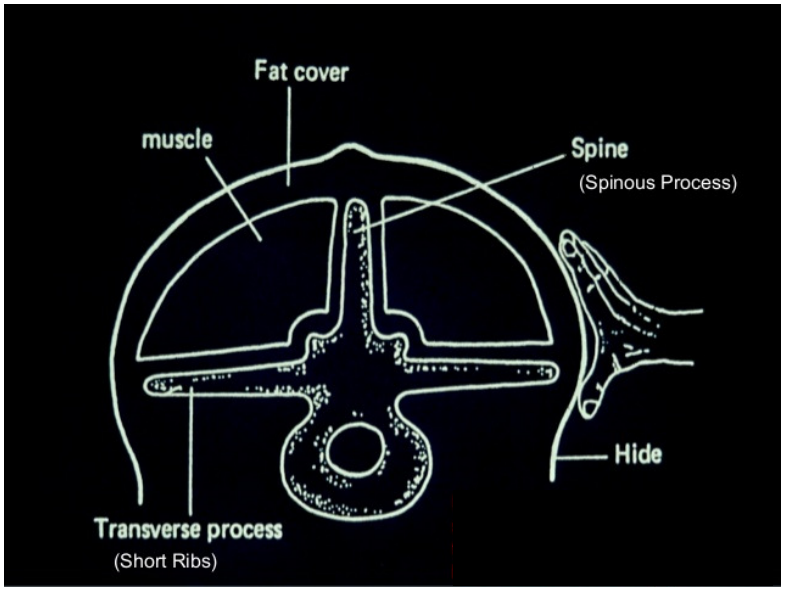
Lizards

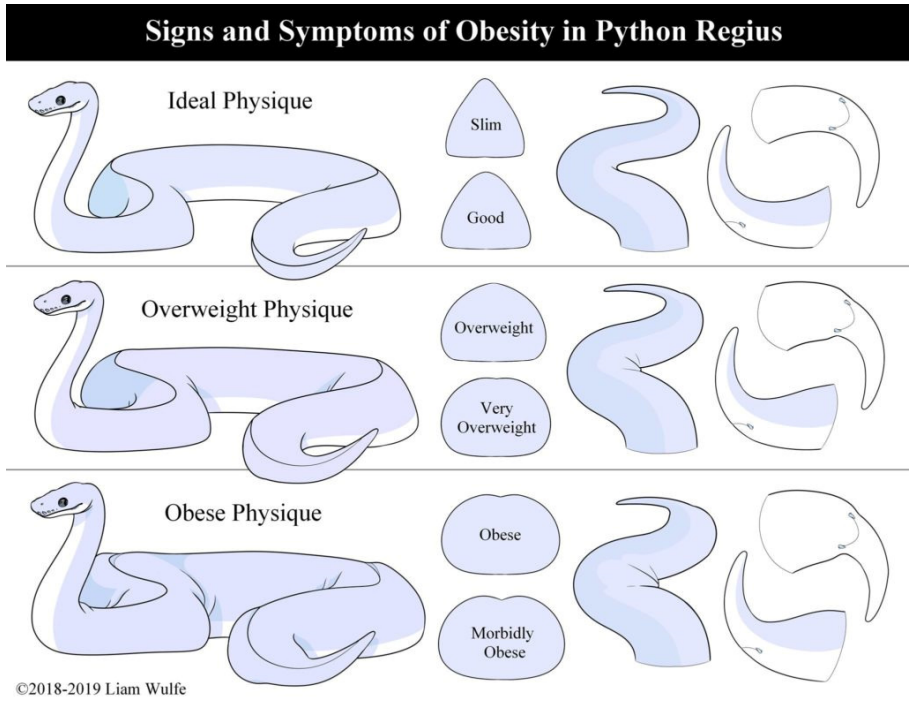
Typically store fat
 in belly and tail

Compare width at cloaca vs tail.



Snakes


Fat cover
muscle
Spine
(Spinous Process)
Hide
Transverse process
(Short Ribs)


Signs and Symptoms of Obesity in Python Regius
Ideal Physique
Slim
Good
Overweight Physique
Overweight
Very Overweight
Obese Physique
Obese
Morbidly Obese
©2018-2019 Liam Wulfe

Snakes

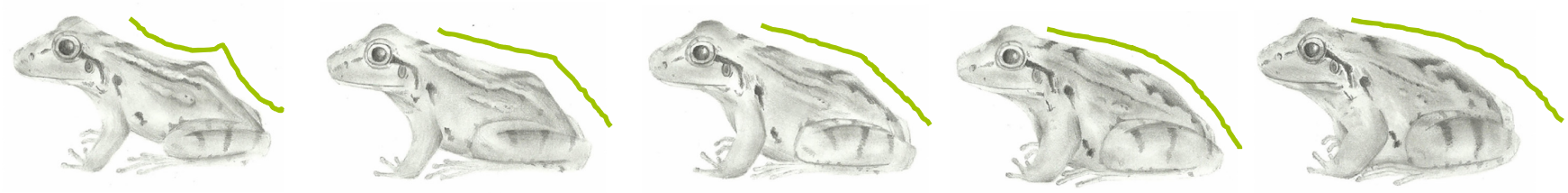
Varies by body shape

On indigo snakes can identify males by Scales shape

???

Frogs

Hips

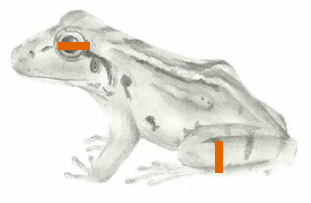


Hips prominent ----------Hint of hips----------No hips

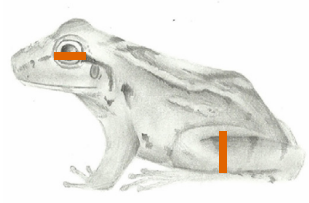
Jayson S, Harding L, Michaels CJ, et al. 2018. Zoo Biology 37:196–205.

Frogs

Use eye width (maximum) as standard



Eye and
calf same width



Calf > eye

Calf >
1.5 x eye

Calf >
2 x eye

Calf >
2 x eye

Jayson S, Harding L, Michaels CJ, et al. 2018. Zoo Biology 37:196–205.

Frogs

Prominence of hip and pelvic bones

Jayson S, Harding L, Michaels CJ, et al. 2018. Zoo Biology 37:196–205.

Frogs

Some frogs can inflate themselves as defense

Avian Body Condition Scoring

Except Penguins

Erin Kendrick, MS

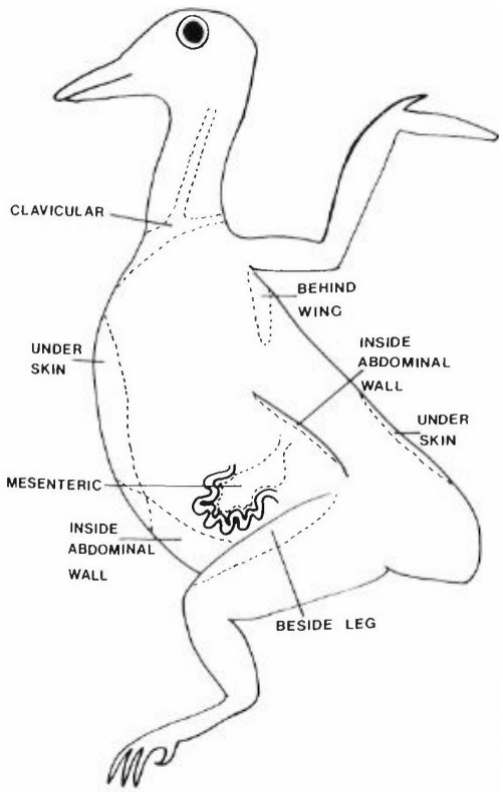
NAG Workshop, 2019

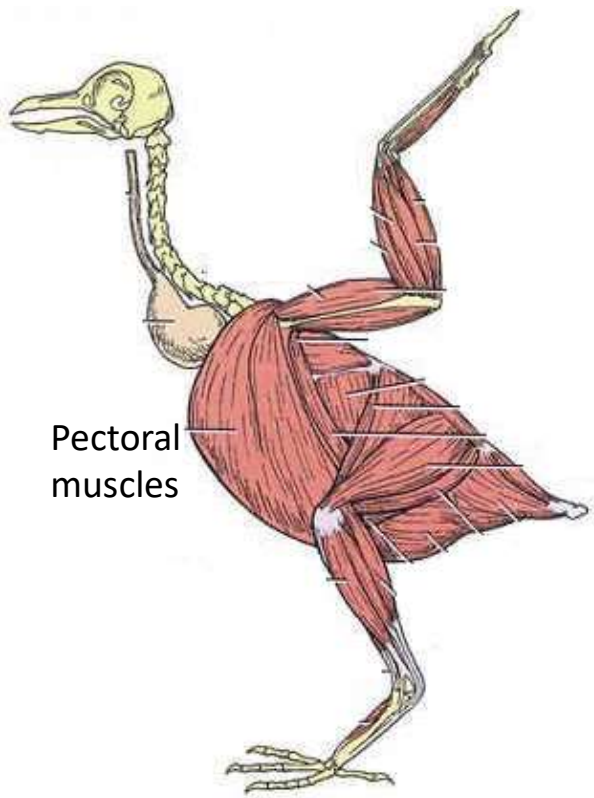
Body Condition Scoring 101

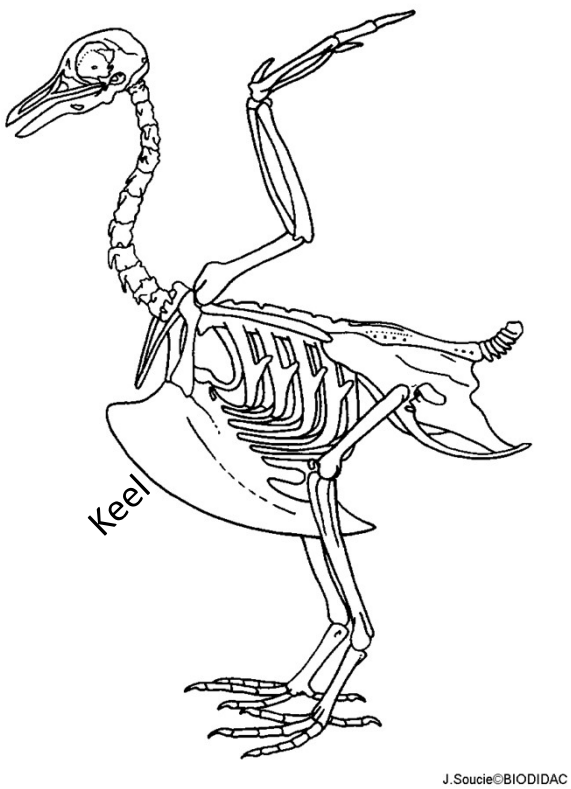
- Subjective measurement of muscular definition and external deposition of adipose tissue
- Goal is to make subjective as objective as possible by being specific and methodical about:
- Process, timing, language, position, etc.
  - it's not about the belly, except in birds in can be!
  - initially developed for use in animal agriculture
- We use a 9 point system (others use 5 or 3 point systems): 9 point helps to account for more subtle changes
  - 1 = emaciated (0 for passerines scores)
  - 9 = obese (8 for passerine fat scores)
  - 4-6 = ideal condition range (0-3 for passerine fat scores)

The Basics

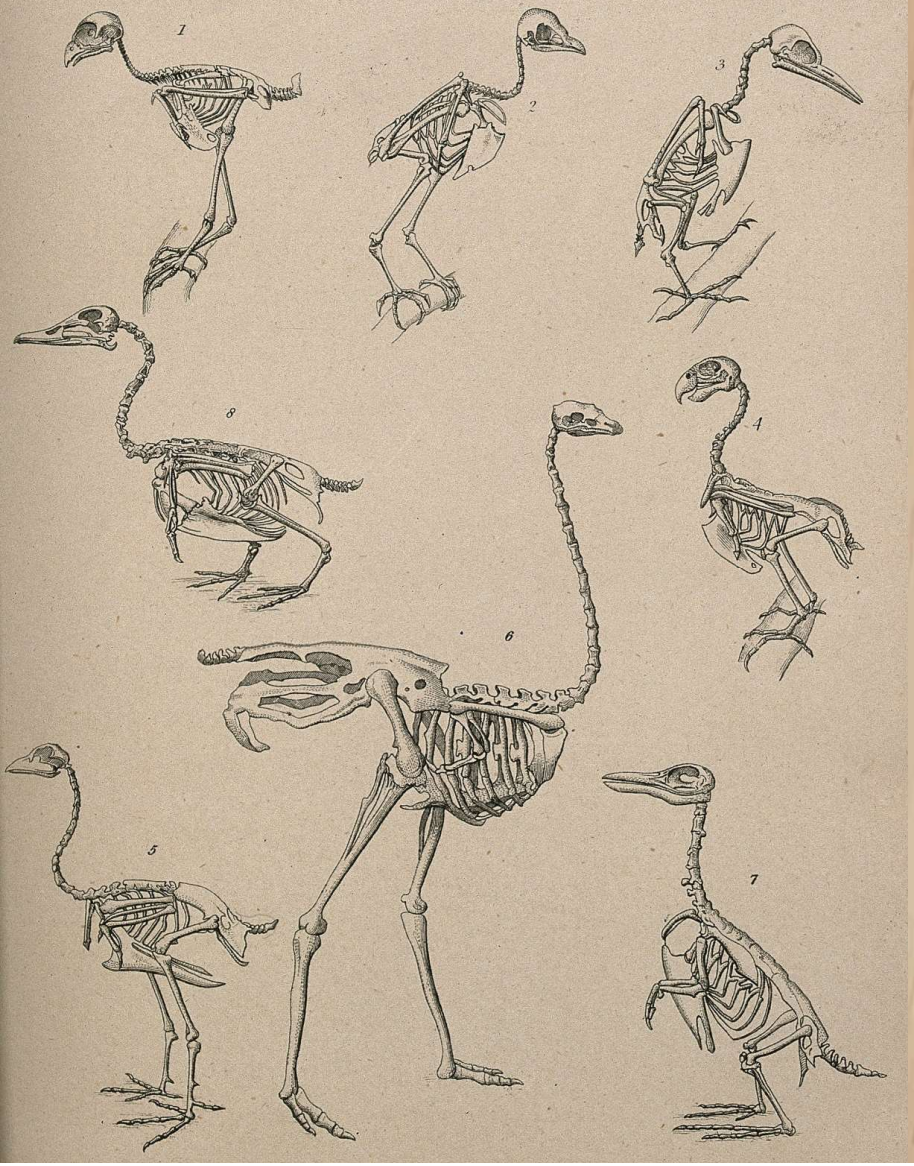
- Know your anatomy and terminology


CLAVICULAR
BEHIND WING
UNDER SKIN
INSIDE ABDOMINAL WALL
UNDER SKIN
MESENTERIC
INSIDE ABDOMINAL WALL
BESIDE LEG


Pectoral muscles


Keel
J.Soucie©BIODIDAC

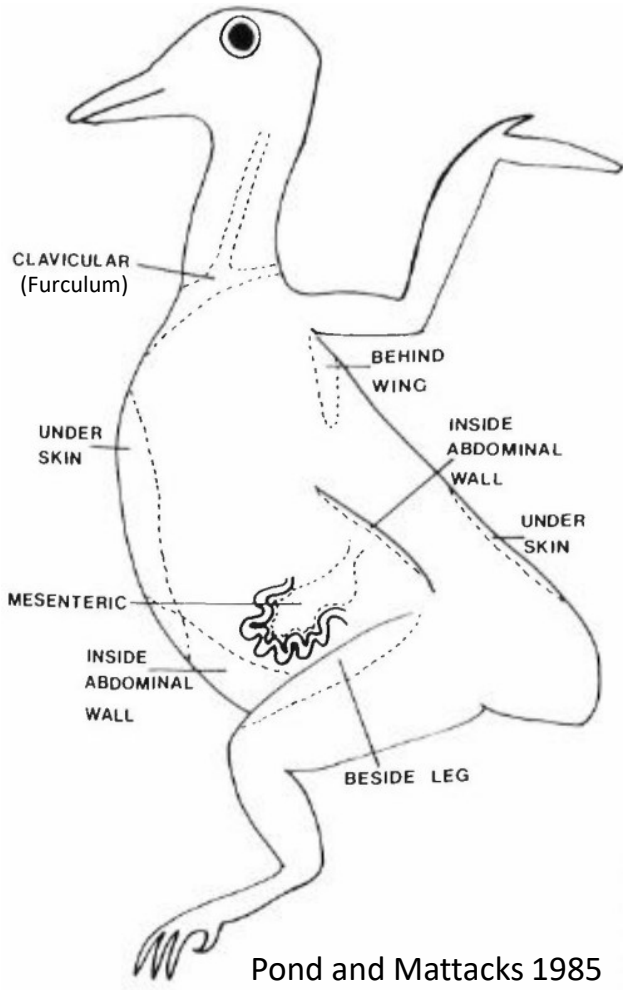
COMPARATIVE VIEW OF THE SKELETONS OF BIRDS.



The Basics

- Know your anatomy and terminology
- Helps to understand how and where fat (adipose) is generally deposited and mobilized

Body Condition Scoring 101

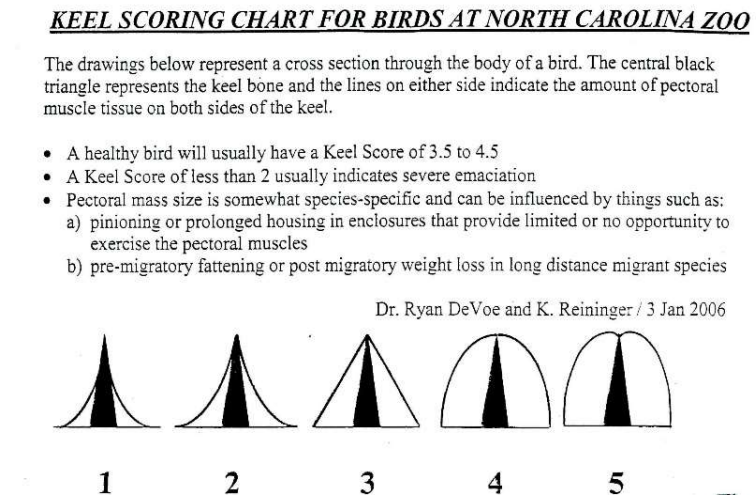


Pond and Mattacks 1985

- AVIAN!
  - Deposition: (1) mesentery (don't see), (2) subcutaneous (CAN SEE)
  - Mobilize: (1) subcutaneous (simultaneous, but faster in abdomen, then thorax, then chest), (2) mesentery
- 6 main sites of adipose deposition:
  - Clavicular
  - Behind Wing
  - Beside Leg
  - Under Skin
  - Mesenteric
  - Abdominal wall

The Basics

- Know your anatomy and terminology
- Helps to understand how and where fat (adipose) is generally deposited and mobilized
- Repeatable, reproduceable, and relatable
  - Same scorer scores same animal the same
  - Different scorers score the same animal the same
  - The score actually means something
- Even if validated, with a specific scale, it is certainly a learned skill

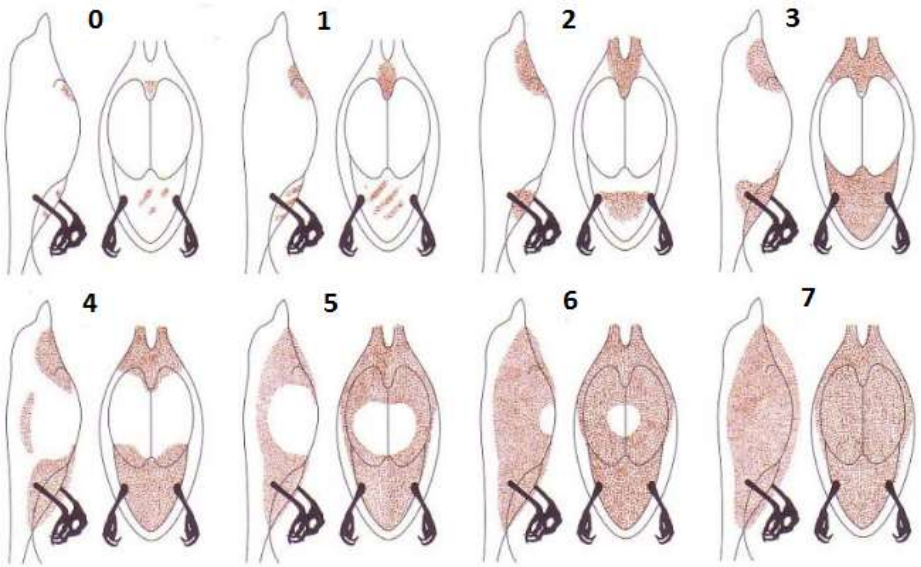


KEEL SCORING CHART FOR BIRDS AT NORTH CAROLINA ZOO

The drawings below represent a cross section through the body of a bird. The central black triangle represents the keel bone and the lines on either side indicate the amount of pectoral muscle tissue on both sides of the keel.

- A healthy bird will usually have a Keel Score of 3.5 to 4.5
- A Keel Score of less than 2 usually indicates severe emaciation
- Pectoral mass size is somewhat species-specific and can be influenced by things such as:
  a) pinioning or prolonged housing in enclosures that provide limited or no opportunity to exercise the pectoral muscles
  b) pre-migratory fattening or post migratory weight loss in long distance migrant species

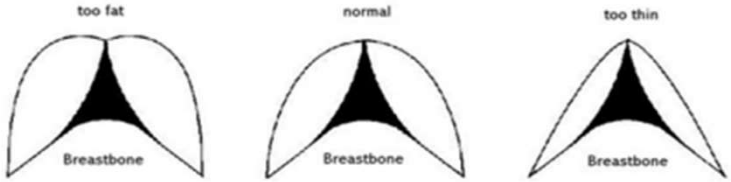
Dr. Ryan DeVoe and K. Reininger / 3 Jan 2006

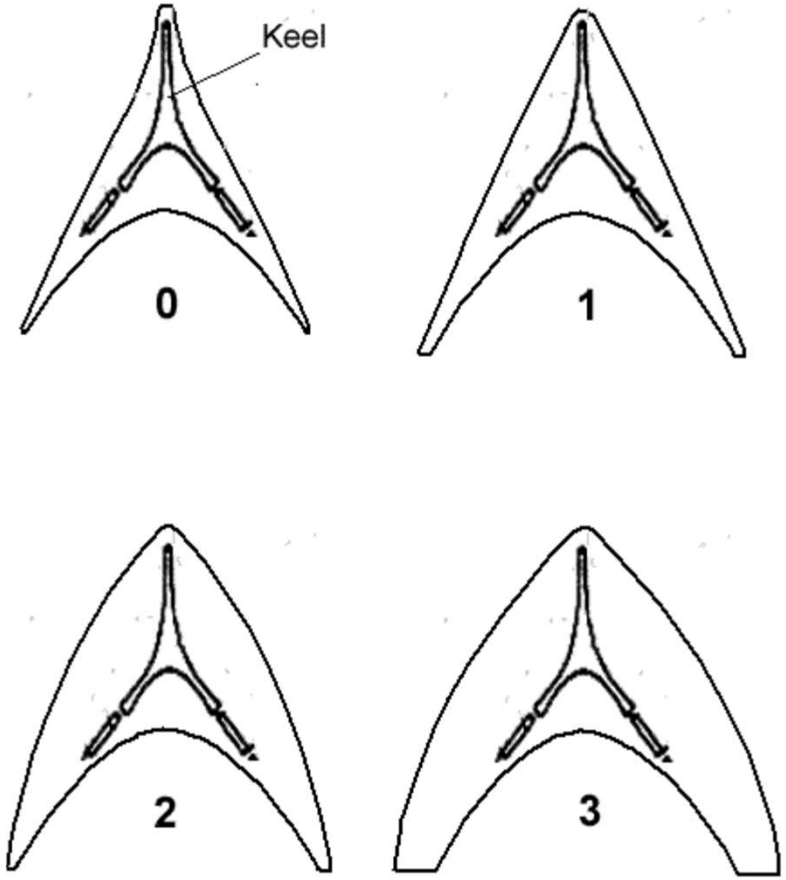


Kaiser 1993

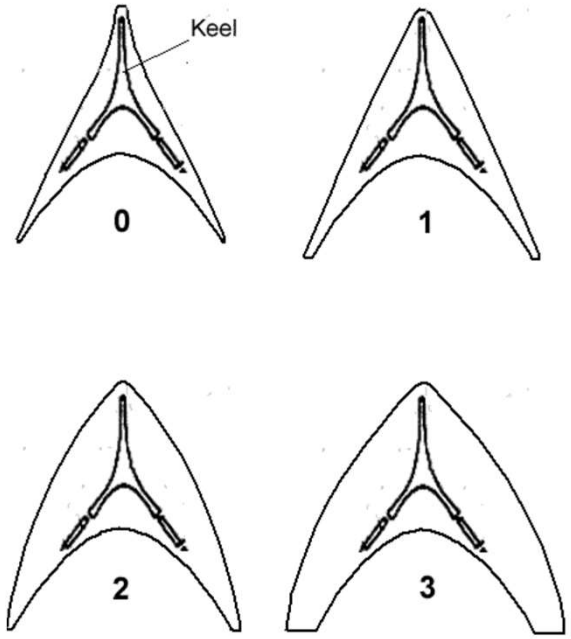
Systems

- Keel score = muscling
- Thoracic cavity +/- abdomen = adipose deposition
- Need for separate scores?
- Other regions? (Ribs, spine, hips?)
- Difference between flighted birds and non-flighted, or those allowed to fly more extensively and not.





Score	Characteristics
0	Prominent ridge on the keel with limited overall breast muscle and a concavity of the breast muscle alongside the keel
1	Greater development of breast muscle which is not concave and feels more or less flat. Keel still prominent.
2	Moderately developed convex breast muscle. Keel less prominent.
3	Well developed relatively plump breast. Smooth over the keel.



Score	Characteristics
0	Prominent ridge on the keel with limited overall breast muscle and a concavity of the breast muscle alongside the keel
1	Greater development of breast muscle which is not concave and feels more or less flat. Keel still prominent.
2	Moderately developed convex breast muscle. Keel less prominent.
3	Well developed relatively plump breast. Smooth over the keel.

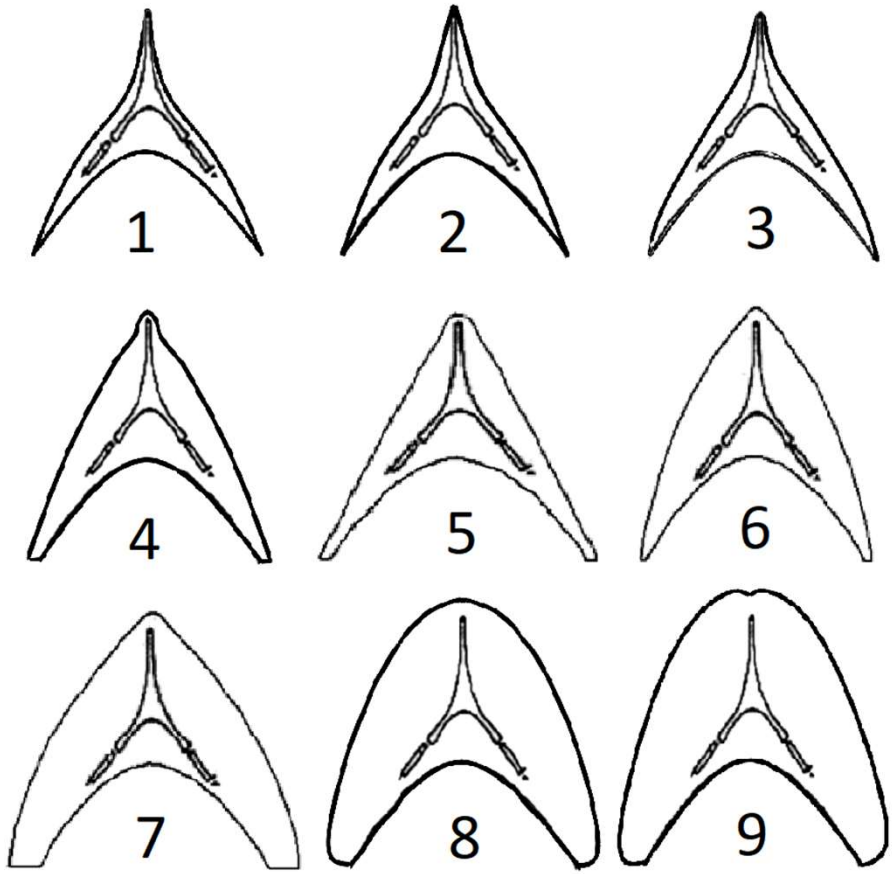
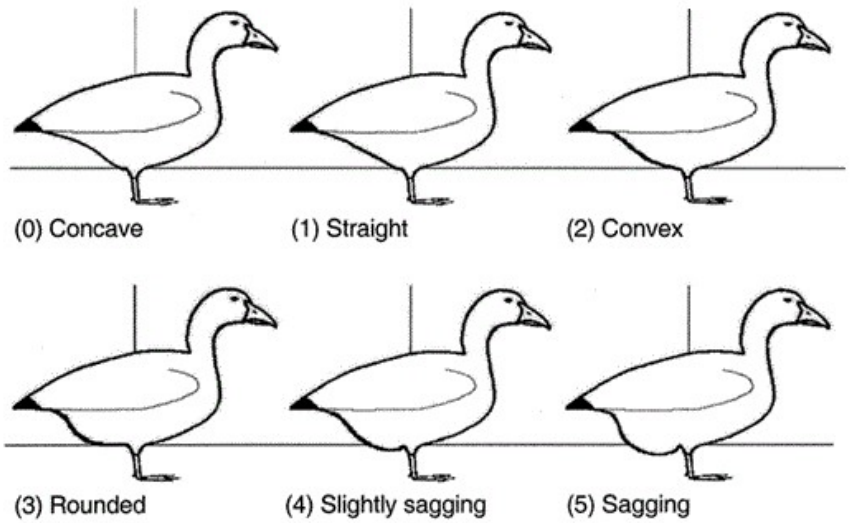

1
2
3
4
5
6
7
8
9

FIGURE 1. Categories used to score abdominal profiles of Greater Snow Geese



Feret et al. 2005

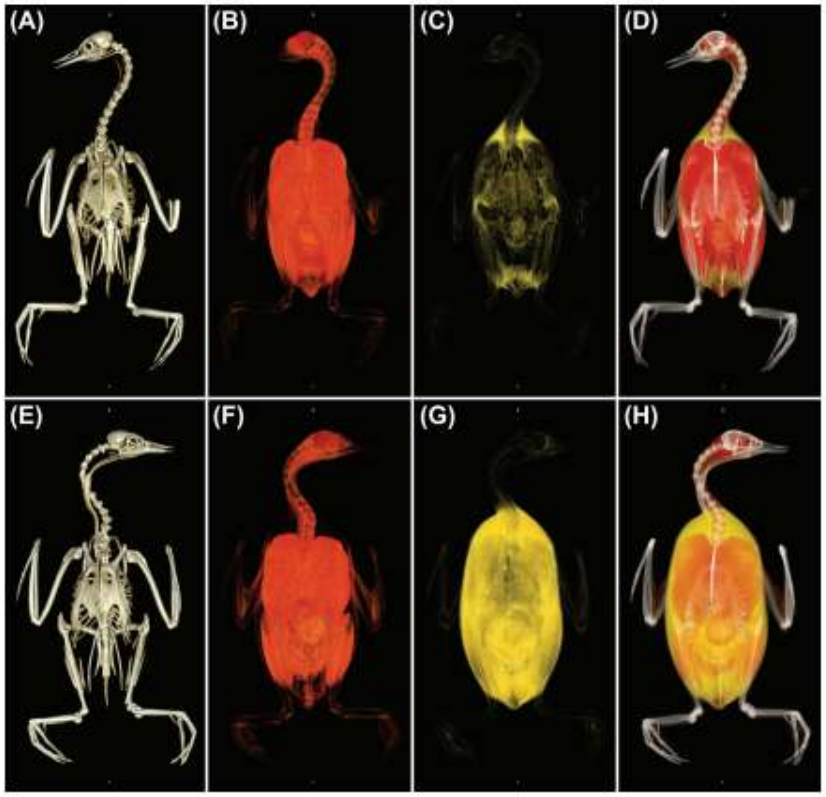


Figure 1. CT-scan reconstructions of two eared grebes with extreme body weights in this study. Top, DPG-13, 238 g. Bottom, CC-74, 469 g. Skeleton: (A, E). Soft tissue: (B, F). Fat: (C, G). Combined volumes: (D, H).

Straker and Jehl 2017

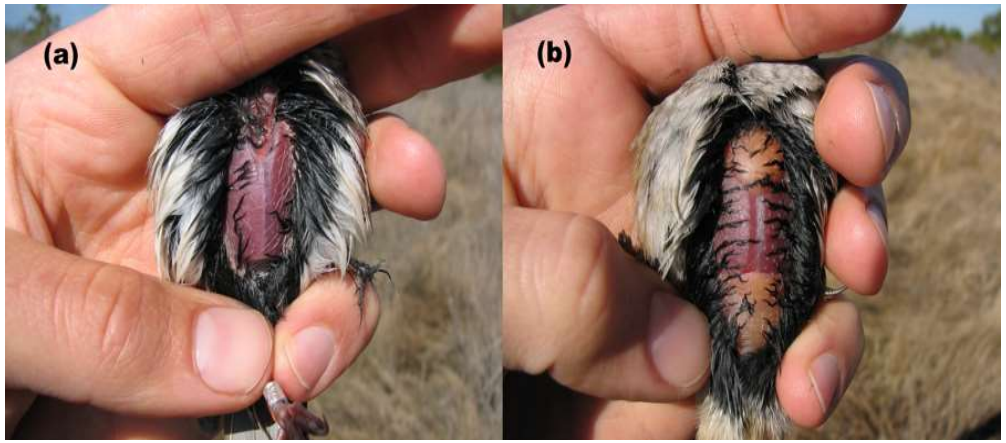


Fig. A1. Representative images of fat and muscle scores. Head is held between index and middle fingers. Ventral feathers are parted to show (a) a lean bird, where furcular fat=1, abdominal fat=1, and muscle=3, and (b) and a heavy bird, where furcular fat, abdominal fat, and muscle=6.

Danner 2013

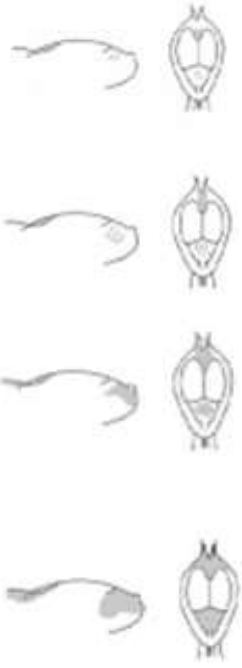
Appendix A: A table of scoring criteria for fat and muscle levels and images of low and high scores.

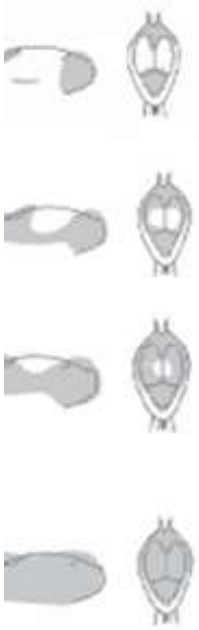
Table A1. Scoring criteria for fat and muscle.

Score	Furcular Fat	Abdominal Fat	Muscle
0	No visible fat	No visible fat	No pectoralis
1	Fills <25% of furculum	Light under ribcage, none on abdomen	Keel very prominent, ribs detectable
2	Fills 26–50% of furculum	Heavy under ribcage, none abdomen	Keel very prominent, ribs not detectable
3	Fills 51–75% of furculum	Under ribcage, partially covering abdomen	Keel prominent
4	Fills 76–99% of furculum	Under ribcage, completely covering abdomen	Almost flush with keel
5	Flush with furculum	On abdomen even with ribcage	Flush with keel (cannot feel keel)
6	Convex (exceeding furculum)	Convex (exceeding the ribcage)	Convex (pectoralis exceeding keel)

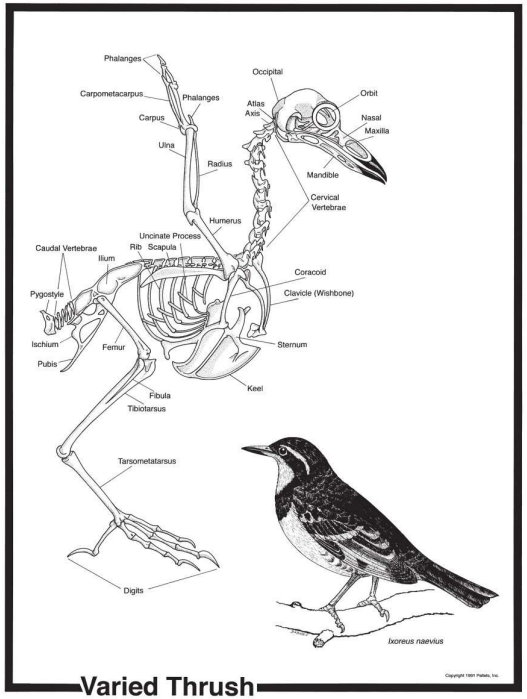
(a) ESF system

Score	Description
0	no visible fat. Dark red
0.5	F and A: trace on one or both
1	F: wide wedge of fat. A: trace of fat. Light red
2	F: completely covered but deeply concave. A: slips of fat. Light yellow
3	F: moderate fat reserves cover ends of inter-clavicles but concave. A: flat or slightly bulging pad. Light yellow
4	F: filled up to far end of clavicles. A: covered by clearly bulging pad of fat. Yellow
5	F: convex bulge, perhaps overlapping breast muscles. A: extreme convex bulge. Yellow
6	F and A: fat covering breast muscles by several mm.
7	F and A: $^3/_4$ of breast muscles covered. Yellow
8	F and A: breast muscles not visible. Yellow

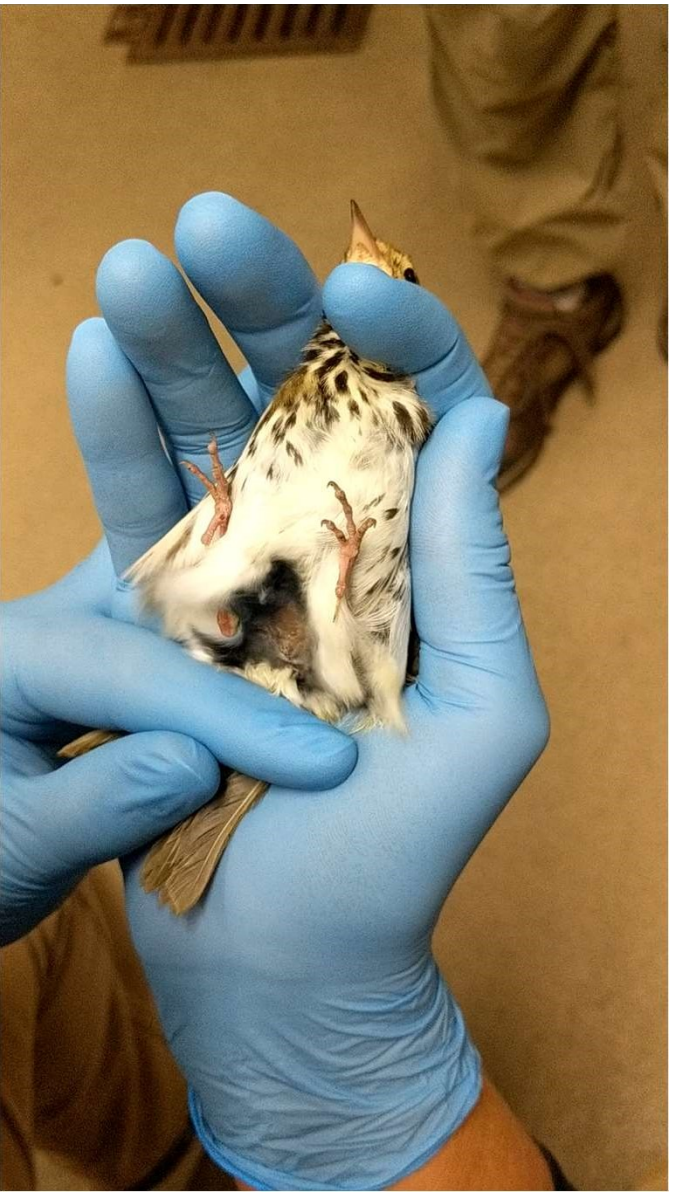




(F=Furcular region or tracheal pit; A=Abdomen)



Varied Thrush



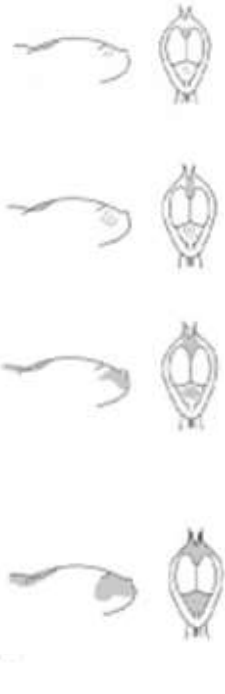
(a) ESF system

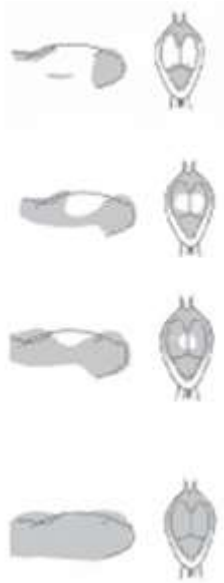
Score	Description
0	no visible fat. Dark red
0.5	F and A: trace on one or both
1	F: wide wedge of fat. A: trace of fat. Light red
2	F: completely covered but deeply concave. A: slips of fat. Light yellow
3	F: moderate fat reserves cover ends of inter-clavicles but concave. A: flat or slightly bulging pa Light yellow
4	F: filled up to far end of clavicles. A: covered by clearly bulging pad of fat. Yellow
5	F: convex bulge, perhaps overlapping breast muscles. A: extreme convex bulge. Yellow
6	F and A: fat covering breast muscles by several mm.
7	F and A: $^3/_4$ of breast muscles covered. Yellow
8	F and A: breast muscles not visible. Yellow

(F=Furcular region or tracheal pit; A=Abdomen)

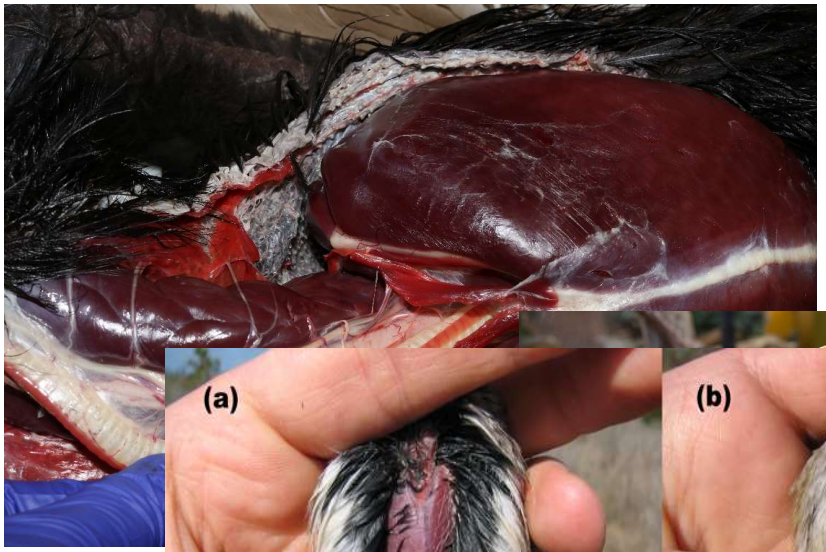
(a) ESF system

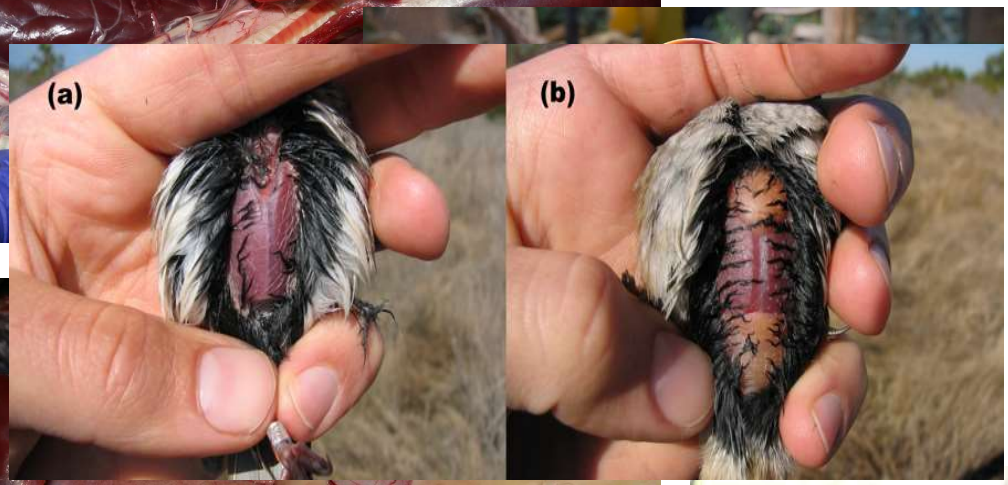
Score	Description
0	no visible fat. Dark red
0.5	F and A: trace on one or both
1	F: wide wedge of fat. A: trace of fat. Light red
2	F: completely covered but deeply concave. A: slips of fat. Light yellow
3	F: moderate fat reserves cover ends of inter-clavicles but concave. A: flat or slightly bulging pa Light yellow
4	F: filled up to far end of clavicles. A: covered by clearly bulging pad of fat. Yellow
5	F: convex bulge, perhaps overlapping breast muscles. A: extreme convex bulge. Yellow
6	F and A: fat covering breast muscles by several mm.
7	F and A: $^3/_4$ of breast muscles covered. Yellow
8	F and A: breast muscles not visible. Yellow

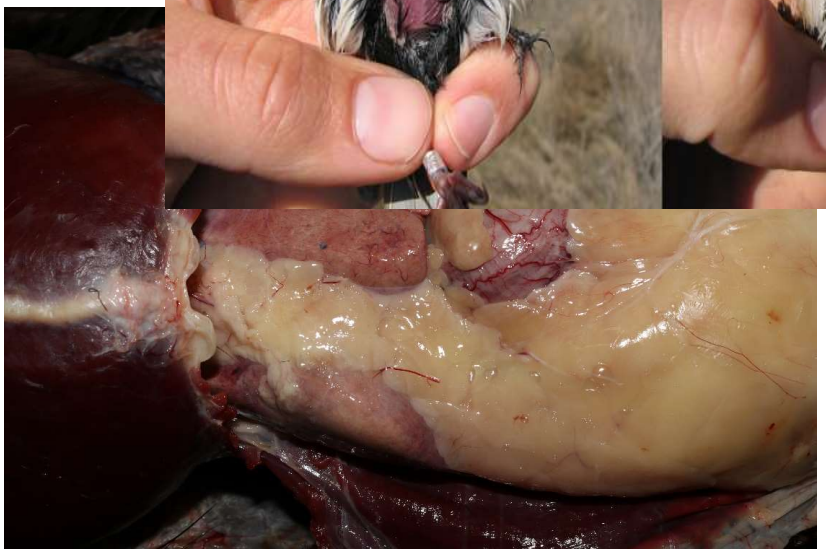




(F=Furcular region or tracheal pit; A=Abdomen)

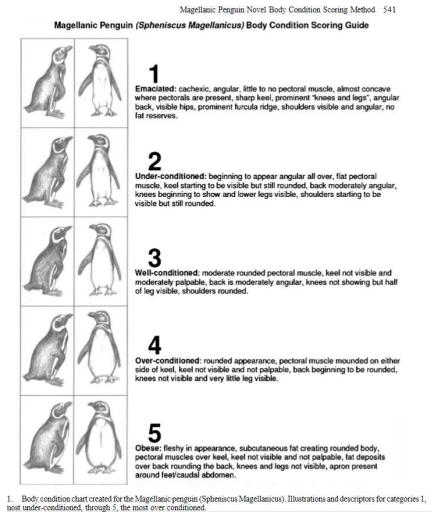






Challenges

- Fighting natural seasonal changes
- Atypical adipose deposition



Magellanic Penguin Novel Body Condition Scoring Method 541

Magellanic Penguin *(Spheniscus Magellanicus)* Body Condition Scoring Guide

1
Emaciated: cachexic, angular, little to no pectoral muscle, almost concave where pectorals are present, sharp keel, prominent "knees and legs", angular back, visible hips, prominent furcula ridge, shoulders visible and angular, no fat reserves.

2
Under-conditioned: beginning to appear angular all over, flat pectoral muscle, keel starting to be visible but still rounded, back moderately angular, knees beginning to show and lower legs visible, shoulders starting to be visible but still rounded.

3
Well-conditioned: moderate rounded pectoral muscle, keel not visible and moderately palpable, back is moderately angular, knees not showing but half of leg visible, shoulders rounded.

4
Over-conditioned: rounded appearance, pectoral muscle mounded on either side of keel, keel not visible and not palpable, back beginning to be rounded, knees not visible and very little leg visible.

5
Obese: fleshy in appearance, subcutaneous fat creating rounded body, pectoral muscles over keel, keel not visible and not palpable, fat deposits over back rounding the back, knees and legs not visible, apron present around feet/caudal abdomen.

1. Body condition chart created for the Magellanic penguin (Spheniscus Magellanicus). Illustrations and descriptors for categories 1, not under-conditioned, through 5, the most over conditioned.

Quick and Dirty Reference Guide to Serum Nutrition Measurements and Approaches

Categories of Serum Parameters

Protein related: Total Protein, Albumin, Globulin, Ammonia

Stress related: C-reactive protein, serum amyloid A, ferritin, (sometimes glucose)

Pancreas related – Amylase, Lipase

Lipid metabolism – Cholesterol, Triglycerides, Non Esterified Fatty Acids, betahydroxy-Butyrate

Carbohydrate metabolism – Glucose, Fructosamine

Renal – Blood Urea Nitrogen, Creatinine, SDMA (symmetrical dimethylarginine)

Liver Enzymes relating to hepatocellular injury: ALT, AST, SDH, GLDH

- Alanine aminotransferase (ALT)
- Aspartate aminotransferase (AST)
- Sorbitol dehydrogenase (SDH)
- Glutamate dehydrogenase (GLDH)

Cholestasis related liver: GGT, Bilirubin, ALP

- alkaline phosphatase (ALP)
- γ-glutamyl transferase (GGT)

Muscle Enzymes: AST (also liver), CK, LDH

- Creatine Kinase (CK)
- Lactate dehydrogenase (LDH)

Iron Metabolism: Iron, TIBC, % transferrin saturation (serum iron / TIBC)* 100, Ferritin; Haptoglobin (protein relating to hemolytic anemia), Ceruloplasmin (copper carrying protein; important for iron tissue release as well)

Minerals and Vitamins

- Macro: Ca, P, Mg
- Electrolyte: K, Na, Cl, Bicarb
- Micro: Fe, Cu, Co, Zn, Se, Mo, S, Mn, I; be aware of interactions and interrelated nutrients (i.e. Fe/Cu/Zn; S/Mo/Cu; Se/Vitamin E)
- Vitamins: Fat soluble more commonly analyzed – E, A, D; Water soluble commonly analyzed: Vitamin C, Folate, B12 (cobalamin)

Questions to consider before interpreting –

- Is this serum or plasma or whole blood?
- Is the sample hemolyzed?
- Where did the sample get analyzed?
- What are other values of this individual for this parameter? For this species at my institution (population)? For this species as a whole from references? Are other values from non-normal individuals?
- What interferences are possible?
- What disease states / physiological state present?
- Don't forget – what is the animal eating?!

Pro-tips:

Normality may not be known for many species, but start with comparisons, and thinking about whether it's in the right ballpark.

Reference ranges are often not "normal" for exotic species though they might give a good starting point!

Always examine the whole diet before throwing individual nutrients as supplementation!

There isn't always a direct answer – look at the whole picture of blood work and whole animal!

Sources of information

Fowler's Zoo and Wildlife Nutrition textbooks and other often non-google-able chapters

eClinPath – Cornell Veterinary reference source information on blood chemistry parameters (revised in recent years)

Peer reviewed literature on the species in question; utilize domestic agriculture ranges as starting guides!

Species 360 / ZIMS (formerly ISIS reference ranges) – with caution!

Colleagues! We are a nutrition community that should always utilize and call on our collective knowledge for the good of the animals under our care.

Inputs: Generating Good Data

Diet Assessment Impact on Welfare

Nutrition Perspective

Nutrition welfare does NOT happen in a vacuum. We are MOSTLY nutrition-focused today, but we need to always consider the related disciplines in the assessment process.

How do we appropriately / accurately assess the diet as formulated, as offered, and as consumed?

How does the animal interact with the diet, conspecifics / enclosure-mates, and the environment within which the diet is offered?

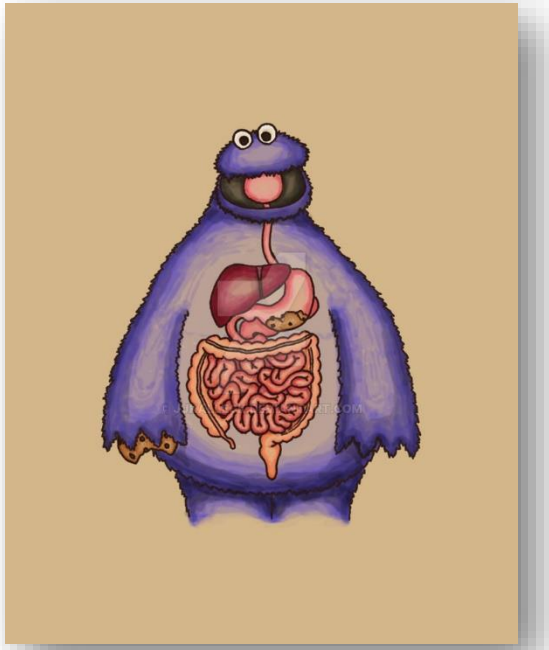
How does this impact assimilation and processing of nutrients/energy?

What **tools** do we have to evaluate diets and ensure good data?

Diet Formulation Considerations

Diet formulation process based on a standard template of considerations:

- Natural history
- GI tract morphology
- Appropriate domestic animal models
- Target nutrient values
- Species-specific considerations
- Foods available
- Health and physiology of the individual/group/species



Tools: Above template, Animal Care Manuals (ACMs), NRCs, “old” husbandry manuals, NAG Fact Sheets, peer-reviewed literature, other verified sources

Diet Formulation/Evaluation Considerations

Evaluation / assessment of the diet as formulated is based on theoretical amounts / proportions offered (on paper)

Tools: calculated by hand, computer-generated analyses, and target nutrient values as comparison (targets developed via species-specific literature, appropriate well-studied domestic animal models, etc).

Constant evaluation should happen with diet changes:

- ingredient list stays “the same,” but ingredients change in nutrient content
  - hays, fish, commercial meat sources, etc
  - know the potential variability of nutrients
- when diets are adjusted, do ingredient proportions change or stay the same, and what is the impact?
- physiology, health status, life stage change, other milestone or influence (so, diet may not drive the evaluations, needs might).

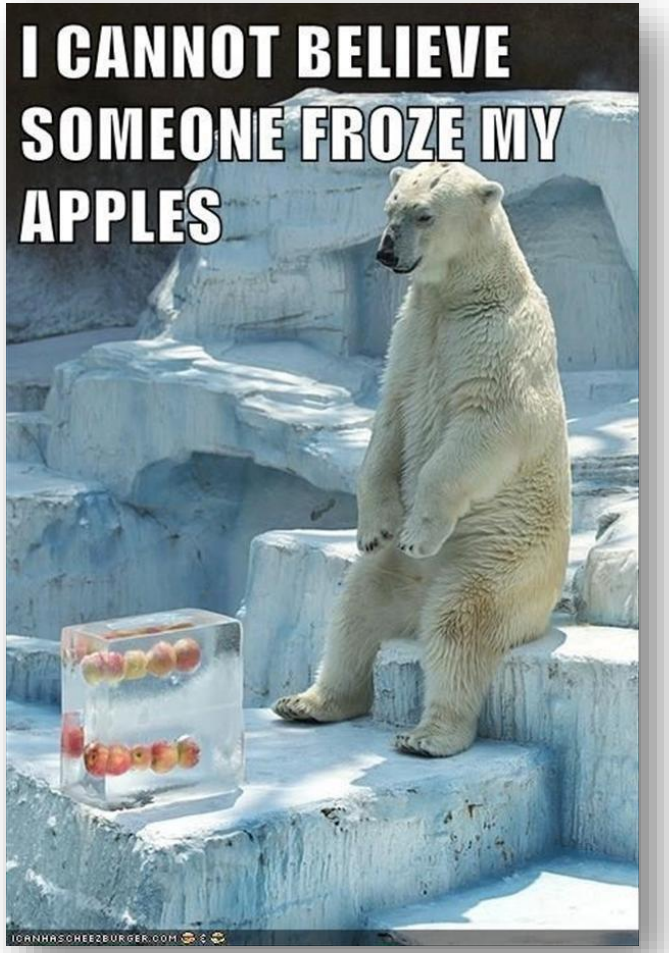
Diet Engagement – Offering the Diet

Some Considerations:

- timing, methods, physical form.

  (ex: arboreal feeders, constant grazers, whole prey eaters, nocturnal feeders, etc)

- is there competition (inter- and intra-species) for the diet?
- are there IPM measures in place?
- is there “work” associated with acquiring the diet?
- is there anticipatory behavior associated with feeding?
- how is intake measured / assessed?



Tools to Assess Intake / Consumption

Identity, amount, and/or both?

Know constraints of the method

Scale to weigh in and out (time and effort intensive)

- utilize a desiccation pan?

Volume measure

Piece count

Bite count

- pasture studies with well-known species

Visual observations

- Game cameras, etc
- Philadelphia aviary
- Value in most cases (paired with above, who eats what)

Fecal sampling?

What others?

Diet As Consumed ≠ As Offered?

Is consumption complete?

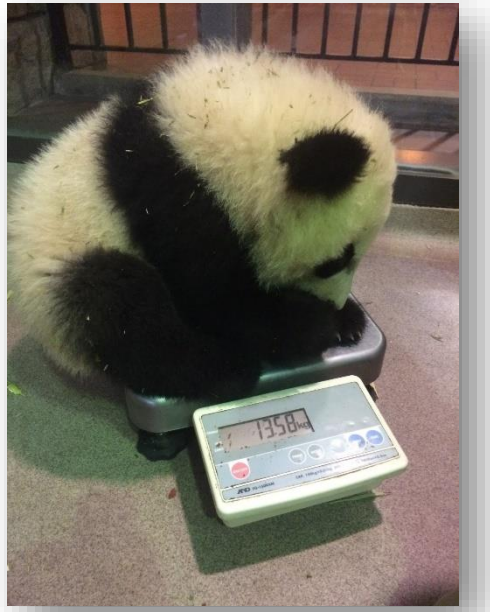
- Why else would diet disappear?
- Selection of individual items or proportional to offered?

Does it still meet target nutrient values? Energy needs?

Some can be assessed “on paper.”

Biology doesn’t always mimic math.

Use of “other” tools (weight measurement, BCS, etc)



Tables as Enclosures

- Tools to Assess Intake
  - Qualitative v quantitative
  - Scales, visual observation, bite counts (consistency of diet), piece count, non-specific percentage of diet consumed/remaining?
  - How accurate do you need to be to make your clinical / welfare assessment?
- Things to consider:
  - Pests, competition, equal access to diet, timing of when diet is offered, **preferences**, **appetite, hunger**, **variety**, training/enrichment items and how they are included, how does preferred item intake change nutrient profile of the diet, was there work to get the diet, other?

Hunger and Appetite

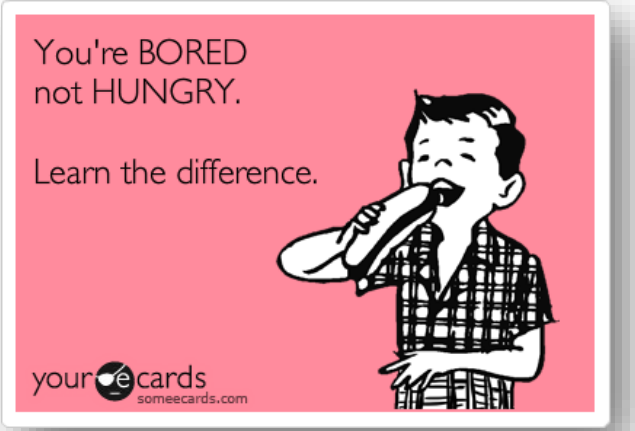
Hunger: normal sensation that makes you want to eat (body tells brain that stomach is empty; fullness is partially controlled by hypothalamus, blood sugar, and having digesta in the stomach/intestines).

Appetite: desire for food, usually after seeing, smelling, of thinking about food. The desire to eat. Can be triggered by hunger, but more often availability of food, boredom, social, or emotional factors (routines for our animals, Clauss EAZA lion example – anticipatory behavior).

Were you hungry when we started the morning talks?

Yes – so, you ate the snacks.

No – but, you ate the snacks. Why?



Variety

<u>Variety</u>: the quality or state of being different or diverse; the absence of uniformity, sameness, or monotony. For diet purposes, it is the variation, from meal to meal (day to day, week to week, or longer) in diet ingredients that allows for an enriching experience for our animals.

How much is enough? What does it look like?

Variety?

Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
3 ingredients daily, every day 	12 ingredients daily, every day 	4 ingredients daily, rotating among 12 ingredients on a weekly basis, in different combinations.	1 ingredient every feeding, 4x per week 	1 ingredient every feeding, 4x per week 
Pellet, hay, and pasture	Biscuit, produce, hay, browse	Biscuit, produce, hay, browse	Live rat	Horse carcass

Preference and the Tough Loves

Preference: a greater liking for one alternative over another or others.

"Our elderly gorilla will not eat zucchini. It eats a bunch of other items."

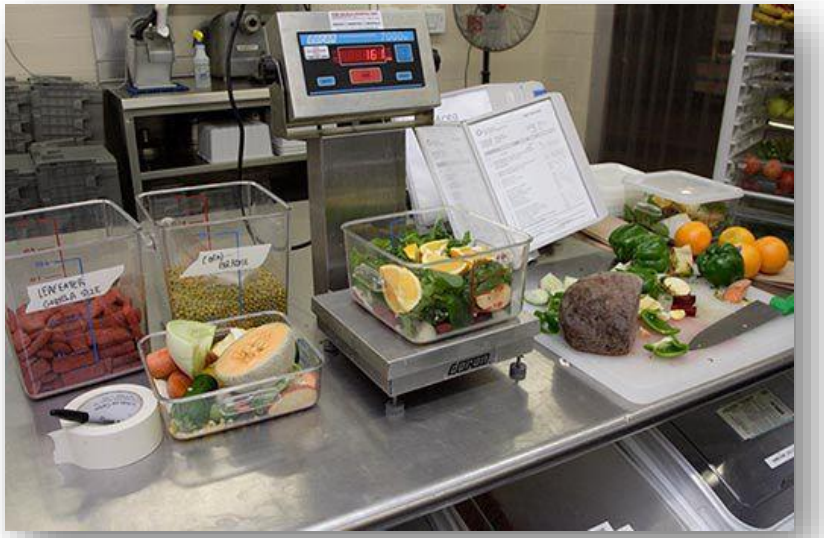
"Our spitting cobra will not eat a frozen/thawed rat. It only eats fresh killed."

"This penguin only eats capelin. We just don't offer it the other types anymore."

"Our [x] animal won't eat."

Diet Re-Assessment

- The regular re-visiting of diets as designed and as offered to ensure appropriate consumption.
- Feedback from keepers / managers.
- “Hone” diet to encourage “balanced” consumption, adjust for consistent intake patterns (amounts and/or ingredients).
- [Can just act to control waste / cost / pests.]



References

Clauss, M. 2019. Feeding Methods for Carnivores. EAZA Zoo Nutrition Conference Workshop. Marwell Zoo, UK. 16 Jan 2019.

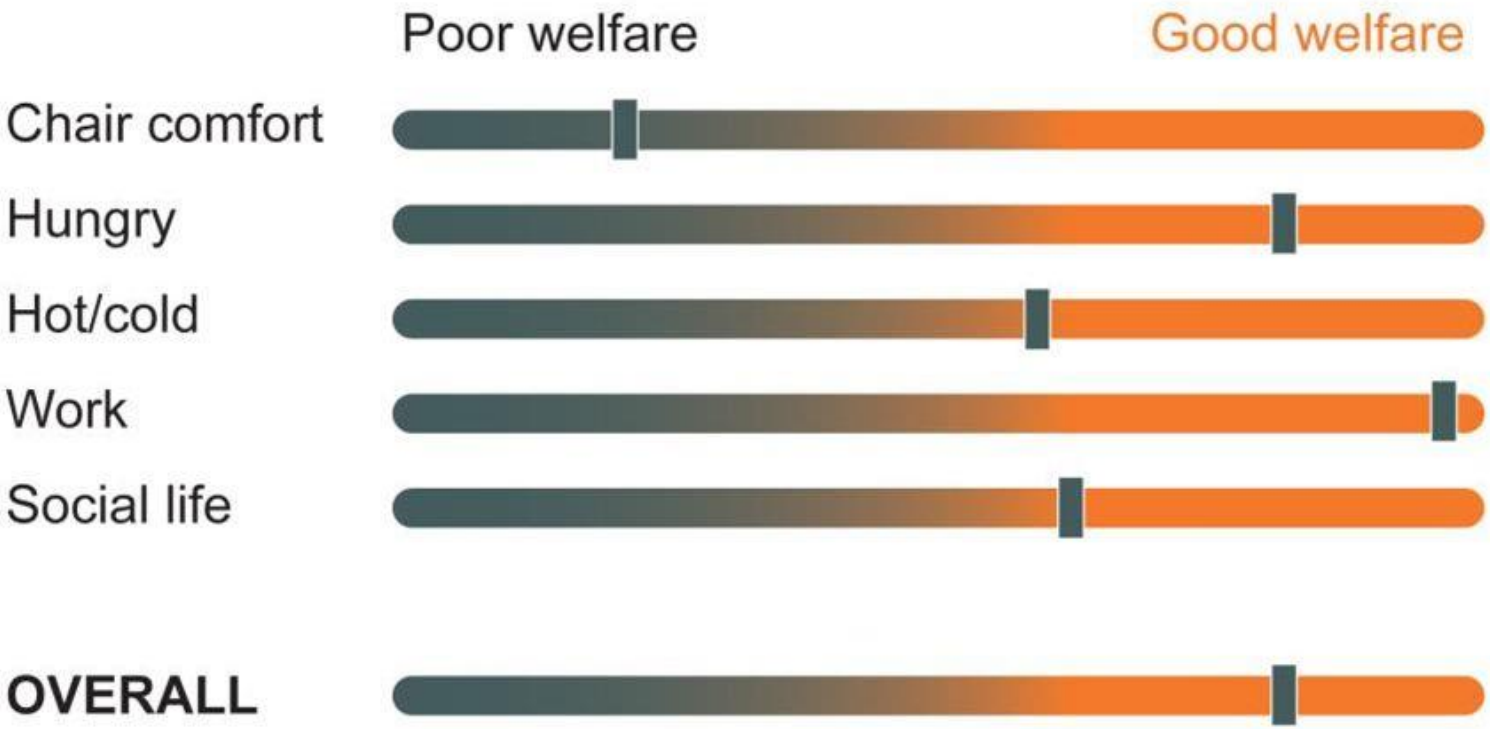
Kawata, K. 2008. Zoo Animal Feeding: A Natural History Viewpoint. Zool. Garten N.F. 78: 17-42.

National Research Council publications.

Nutrition Welfare Toolkit

Trying to Put the Pieces Together

Some aspects of your welfare



FIVE DOMAINS MODEL

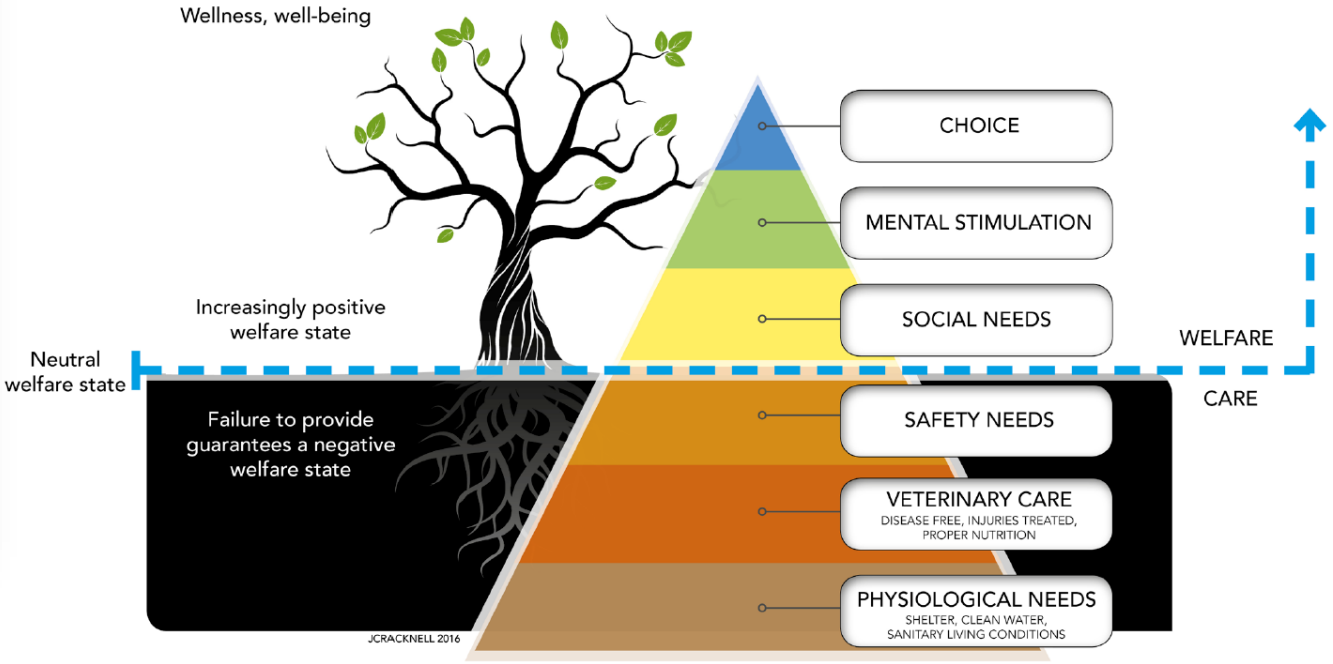
PHYSICAL / FUNCTIONAL DOMAIN

NUTRITION	ENVIRONMENT	PHYSICAL HEALTH	BEHAVIOUR
Deprivation of food Deprivation of Water Malnutrition	Environmental challenge	Disease Injury	Behavioural restriction
Appropriate Nutrition Available Food	Environmental opportunity & choice	Fitness Ableness	Behavioural expression

MENTAL DOMAIN

NEGATIVE EXPERIENCES		POSITIVE EXPERIENCES	
Pain Fear Distress Discomfort Denility Weakness Dizziness	Weakness Dizziness Breathlessness Boredom Frustration Anger etc...	Saftey Reward Goal directed engagement Playfulness Curiosity	Vitality Calmness Security Contentment Affectionate companionability etc...

WELFARE STATUS



AZA Accreditation Standard 1.5.0

Positive indicators of welfare (nutritional):

- Well balanced diet, variety, choice
- Normal appetite and access to diet
- Good body condition
- Species and individual appropriate weight
- Normal fecal consistency

Page 24 Inspector's Handbook (AZA website)

Nutritional welfare does not happen in a vacuum.

4. Guide To Creating An Animal Welfare Assessment Process Under 1.5.0

This document is intended to help both inspectors and institutions understand what elements—at minimum—must be included in the animal welfare assessment process required under standard 1.5.0.

> **Standard 1.5.0**: The institution must follow a written process for assessing animal welfare and wellness.
>
> **Explanation:** This process should be both proactive and reactive, transparent to stakeholders, and include staff or consultants knowledgeable in assessing quality of life for animals showing signs of physical or mental distress or decline. The process should also include a mechanism to identify and evaluate the welfare/wellness impacts of significant life events or changes in the animal's environment as identified by the individual institution. Examples of life events/changes could include construction events, unusual weather events, noise intrusion, change in housing, or changes in animals exhibited with or nearby, etc. Animal welfare/wellness refers to an animal's collective physical and mental states over a period of time, and is measured on a continuum from good to poor.

Accreditation Requirements Explained

1. Identify staff or consultants knowledgeable in animal welfare
   a. Employment of a dedicated welfare scientist is not required for compliance with the standard.
   b. Individuals developing or performing welfare assessment procedures must have at least a baseline knowledge of animal welfare science. There are numerous avenues to acquire this basline knowledge of welfare science. Some possible examples include:
      i. Transfer of knowledge from institutional staff knowledgeable in welfare science (i.e. your veterinarian or other animal care professionals)
      ii. There is a free online course on "Animal Welfare" developed by the AZA Animal Welfare Committee that is available via San Diego Zoo Global online training (http://sdzglobalacademy.org).
      iii. There is an AZA professional development course entitled "Animal Welfare: Evidence Based Management" (http://www.aza.org/animal-welfare-evidence-based-management)
      iv. There are numerous other online and academic-based courses in welfare science.
   c. The animal care staff should be the primary implementers of the welfare assessment process, but there may be circumstances where "non-animal" staff or volunteers can play a role in the assessment process with appropriate training.

> Plain language: You do not have to hire a welfare scientist or send people to an expensive course to be in compliance with the standard, but you do need to make sure the staff that develop and implement your welfare monitoring process have at least a basic level of training in welfare science.

AZA Accreditation Standard 1.5.0

		YES	NO	N/A	A/Q/U
AC-20.	Is animal welfare a top priority at the institution? [1.5.0, 1.5.1, 1.5.2, 1.5.2.1, 1.5.7, 1.5.8]	☐	☐	☐	_____
AC-21.	Does the institution have a process for assessing animal welfare and wellness? [1.5.0]	☐	☐	☐	_____
a.	If yes, is the process transparent to stakeholders?	☐	☐	☐	_____
b.	If yes, does the institution's staff receive training in assessing animal welfare?	☐	☐	☐	_____
c.	If yes, does the assessment process include an evaluation of welfare/wellness as well as the events and/or changes that may impact the animal or group of animals?	☐	☐	☐	_____
d.	If yes, are assessments being done on a regular basis?	☐	☐	☐	_____
AC-22.	Is the welfare of *all* animals residing at the institution considered and assessed?	☐	☐	☐	_____
AC-23.	Does the institution have a process for reporting animal welfare concerns by paid and unpaid staff, without retribution, that meets the requirements outlined in the AZA standard? [1.5.8] < A + >	☐	☐	☐	_____
a.	If yes, do paid and unpaid staff appear to have adequate knowledge of the process for reporting a welfare concern? < A + >	☐	☐	☐	_____
b.	If yes, does the institution look into each reported concern in a timely manner? < A + >	☐	☐	☐	_____
c.	If yes, does the institution provide feedback to the reporting individual? < A + >	☐	☐	☐	_____
d.	If yes, does the process supplement the normal chain-of-command to assure that personal conflicts do not have influence over the process or outcomes? < A + >	☐	☐	☐	_____

Tools in the Toolkit

Body Weight Measurement

- Scales, weight tapes, etc

Integument Assessment (skin, fur, feathers, scales, etc)

- Salmofan, Yolkfan, etc

Body Condition Score (BCS) (also muscle / fat scoring of birds)

- BCS Resource Center

Fecal Condition Score (FCS)

- FCS Resource Center

Diet Ingredient Quality / Nutrient Content

- HACCP plan, SWF food safety checklist, fridge/freezer temp logs, temperature loggers/recorders, GloGerm, microbiological testing, SOPs and SSOPs in the kitchen(s), consistency in diet prep, safe browse species list, scheduled inspections

Diet Consumption Assessment

- Weigh in / out, volume measures, piece count, direct observation, game cameras, bite count, fecal collection

Diet Formulation Template / Considerations

- Natural history, GI morphology, domestic animal models, target nutrient values, species-specific needs, health and physiology of individual/group/species, foods available

Diet Evaluation / Record-keeping

- Meets nutrient and energy needs for individual/group, feedback/communication to prompt re-evaluation

Blood and Tissue Value Assessments

- Specific nutrients, secondary compounds/metabolites

Specialized Assessments

- Ultrasound, radiographs, respirometry, indirect body composition, thermal imaging, allergy testing

Necropsy

DRAFT **"Menu" of Welfare Assessment Questions**
(AZA Animal Welfare Committee)

		Relevance to Five Opportunities to Thrive (Opportunity…)					Relevance to Five Domains				
Item	**Input or Outcome**	**for a well-balanced diet**	**to self-maintain**	**for optimal health**	**to express species-specific behavior**	**for choice and control**	**nutrition**	**environment**	**physical health**	**behavior**	**mental or affective states**
Diet sheets/presentation											
how often is the diet varied for this animal?	input	yes	no	yes	no	yes	yes	no	yes	no	no
can you describe the diversity of ways in which the diet is presented and how the animal reacts to that diversity?	input & outcome	yes	no	yes	yes	yes	yes	no	yes	yes	no
written diets are available	input	yes	no	no	no	no	yes	no	no	no	no
there is a varied, species-appropriate diet, and an adequate supply of fresh drinking water of appropriate temperature is accessible for all individuals	input	yes	no	no	no	no	yes	no	no	no	no
is a diet sheet available for each species/individual as appropriate, and is it regularly evaluated?	input	yes	no	no	no	no	yes	no	no	no	no
is the frequency of diets offered species-appropriate?	input	yes	no	no	no	no	yes	no	no	no	no
if group fed, consumption is monitored for all individuals	input	yes	no	no	no	no	yes	no	no	no	no
food and water are presented in a way that encourages natural foraging behaviors	input	no	yes	no	yes	no	no	yes	no	no	no
the animal displays natural foraging and drinking behavior, considering behavioral data if available	outcome	no	yes	no	yes	no	no	no	no	yes	no
the animal regularly consumes at least 80-90% of the diet offered	outcome	no	yes	no	no	no	yes	no	no	yes	no
is a species-appropriate, varied diet offered, considering foods offered?	input	yes	no	no	no	no	yes	no	no	no	no
is a species-appropriate, varied diet offered, considering methods of presentation?	input	yes	no	no	no	no	yes	no	no	no	no
is a species-appropriate, varied diet offered, considering whole vs partial vs manufactured food?	input	yes	no	no	no	no	yes	no	no	no	no
is a species-appropriate, varied diet offered, considering the frequency of diet adjustment?	input	yes	no	no	no	no	yes	no	no	no	no

Sources: Brookfield Zoo/Chicago Zoological Society, Cincinnati Zoo & Botanical Garden, Denver Zoo, Greensboro Science Center, Lincoln Park Zoo, Oklahoma City Zoo & Botanical Garden, Point Defiance Zoo & Aquarium, Riverbanks Zoo & Garden, Saint Louis Zoo, Toledo Zoo & Aquarium, Zoo Atlanta, materials from the Aquatic Animal Welfare Workshop, and publications by Sherwen et al., 2018 and Benn et al., 2019.

are the animals eating? (and growing, if relevant)

have you observed challenges with nutrition-related health issues such as vitamin/mineral deficiency or excess, loss of condition, obesity, plant/browse toxicity, trauma from feeding aggression, etc.?

animal is provided with highest quality nutrition

the quantity of food supplied is adequate for each individual

the quality of food supplied is good

animal is provided food at species- or individually-appropriate frequency

animal is able to physically consume food normally or with accommodations made (soaking food, cooking produce, etc.)

food and other key resources are distributed so that even the lowest ranking animal has good access

supplied food is appropriate for the species and individual

all animals have safe access to food and water

DRAFT

does the diet allow for enrichment foods to be offered?

does the diet include bones and carcass foods? how often?

is each animal's diet nutritionally well-balanced (food and water), including appropriate vitamins and supplements?

can all animals have safe access to food and water?

is each animal supplied food and water that is maintained hygienically?

animal is offered a diet designed and analyzed according to professional standards
animal is being fed a diet that is nutritionally similar to the recommendations of industry standards
is each animal provided with a high standard of nutrition that is species-appropriate and reflects variety?
is browse provided to the extent that is appropriate for the species?
[item wording to be adapted depending on response type] variability in food type/presentation
[item wording to be adapted depending on response type] food consumption
is good welfare indicated by the amount of food consumed, considering percent of total food offered?
is good welfare indicated by the amount of food consumed, considering scale weight?
is good welfare indicated by the amount of food consumed, considering target volume/weight?
is good welfare indicated by body condition score/weight?
is good welfare indicated by body condition, growth rate?
has the scale of growth been identified?
considering feeding behaviors, is the appetite appropriate?
considering feeding behaviors, are natural feeding behaviors supported?
considering feeding behaviors, is polyp extension present?
considering feeding behaviors, is exploration present?
considering nutritionally-appropriate diets, are vitamin supplements given?
considering nutritionally-appropriate diets, are blood nutrient levels/cation sufficient?
is good welfare indicated by physical signs of eating, specifically, are jelly intestinal contents observed?
is good welfare indicated by physical signs of eating, considering zooxanthellae abundance/coloration?

DRAFT

is there a body condition score (bcs) system for this species?
animals are in good body condition
is there an established body condition scale for this species?
animals appear to be in appropriate body condition for the individual's age/sex/season (e.g., appropriate weight and coat/feather/skin condition)
is the weight and body condition appropriate for the individual animal(s)?
animal has appropriate weight, body condition for age class
weight and/or body condition scores are appropriate for the individual
animal appears to be in good body condition (weight, hair, scales, feathers, nails, hoofs, teeth, beak)
is an absence of prolonged hunger indicated by body condition score?
does the animal look emaciated, well-conditioned, under-conditioned, over-conditioned, or obese?
animal(s) is not over- or under-conditioned
is body coloration indicative of good welfare?
is fin condition indicative of good welfare?

TABLE 1: Factors scored within physical parameters (*italics*—factors only scored in primates, underline—factors only scored in birds)

Score	General condition (weight, condition score, coat/feather condition)	Clinical assessment (including injury, alopecia, vomiting and other clinical symptoms)	*Faecal consistency*	Activity level, mobility	Not eating/drinking or reported hungry/thirsty
1	Weight within normal range and good condition and coat/feather condition.	Clinically healthy; no injuries	Formed	Normal	Normal
2	Weight outside normal range by <10% and slightly over/under condition for <14 days. And/or a minor reduction in coat/feather condition <14 days.	Mild transient subclinical/clinical symptoms (including vomiting) or injury, little effect on welfare and full rapid recovery expected	Soft but formed (below 50% of total or for less than three days)	Increased activity (not caused by normal variation)	Food/water intake reduced
3	Weight outside normal range by <10% and slightly over/under condition for >14 days. And/or a minor reduction in coat/feather condition >14 days.	Mild clinical disease with symptoms and/or some minor injury, and some effect on short-term welfare but with full recovery expected	Soft but formed (above 50% of total or for more than three days)	Increased activity or slight reduction in activity (possible cause: environmental factors or nesting)	Food/water intake reduced, or reported hungry for two to three days (one to two in birds)
4	Weight outside normal range by <20% and over/under condition for <14 days. And/or a substantial reduction in coat/feather condition <14 days.	Mild-to-moderate clinical disease with medium-term effect on welfare but with expected full recovery	Soft (below 50% of total or for less than three days)	Increased activity or reduced activity (no direct cause noted)	Food/water intake reduced or reported hungry for four to five days (three to four in birds)
5	Weight outside normal range by <20% and over/under condition for >14 days. And/or a substantial reduction in coat/feather condition >14 days.	Moderate clinical disease or injury with moderate effect or long-term effect on welfare and unknown long-term recovery potential	Soft (above 50% of total or for more than three days)	Sizeable increase or decrease in activity that shows full recovery not related to courtship	Food/water intake reduced for two days or reported hungry for six to seven days (five to six in birds)
6	Weight outside normal range by <30% and over/under condition for <14 days.	Moderate clinical disease or injury with severe short-term effect on welfare and unknown long-term recovery potential	Loose (below 50% of total or for less than three days)	Sizeable increase or decrease in activity that shows some recovery not related to courtship	Food/water intake reduced or reported hungry for seven to eight days
7	Weight outside normal range by <30% and over/under condition for >14 days.	Moderate clinical symptoms or injury and severe or long-term effect on welfare and little chance of full recovery	Loose (above 50% of total or for more than three days)	Sizeable increase or decrease in activity that is consistent throughout the day	Food/water intake reduced or reported hungry for more than nine days
8	Weight outside normal range by >30% and/or over/under condition for <14 days.	Severe disease with clinical symptoms or severe injury with long-term impact on welfare and little chance of full recovery	Very loose (below 50% of total or for less than three days)	Minimal movement or signs of hyperactivity	Animal reported very thirsty or dehydrated for one day or anorexic for one day (less than one day in birds)
9	Weight outside normal range by >30% and/or over/under condition for <21 days.	Chronic or acute severe disease/s with pain, negatively affecting welfare or severe injury with long-term welfare effects and no chance of full recovery	Very loose (above 50% of total or for more than three days)	Lethargy or hyperactivity	Animal reported very thirsty or dehydrated for two days or anorexic for two days (one day in birds)
10	Weight outside normal range by >30% and over/under condition for >21 days.	Severe disease with clinical signs and/or severe injury with high long-term welfare impact and no chance of full or moderate recovery	Soft to very loose with the presence of blood and/or mucus.	Complete lethargy (no movement, possible minimal movement when encouraged)	Animal reported very thirsty or dehydrated for three days or anorexic for three days (more than one day in birds)

Denver Zoo assessment (designed by behavior/enrichment person):

Access to drinking water	1	Drinking water is cleaned and refreshed daily and all animals have ready access
	0	Clean, fresh drinking water is always available; subordinate animals may be excluded from access at times
	-1	Water is not readily available for all animals or water or water sources/containers are not kept clean
Variability in food type/presentation	1	Variability in food types offered; spatial and temporal food presentation engages animal in the activity of acquiring food; opportunities provided for animals to acquire food using natural feeding/foraging behaviors
	0	Consideration given to varying the spatial and temporal presentation of food items; animals have some opportunities to acquire food using natural feeding/foraging behaviors
	-1	Little opportunity for animals to acquire food using natural feeding/foraging behaviors
Activity level	1	Activity level is normal for this species/individual
	0	Animal engages in most normal activities at expected frequencies
	-1	Lethargic compared to normal activity patterns; animal may only be engaging in self-maintenance behaviors
Body condition	1	Optimal body condition as evaluated by formal or informal BCS ratings (mid-point of an odd-numbered BCS scale) or visual or tactile assessment
	0	Body condition may be slightly different than optimal as evaluated by formal or informal BCS ratings (bracketing the mid-point of an odd-numbered scale) or visual or tactile assessment
	-1	Body condition marginal as evaluated by formal or informal BCS ratings or visual or tactile assessment (animal obese or emaciated); at either extreme of an odd-numbered scale
Coprophagy	1	Has not been observed
	0	Rare instances of coprophagy (once/week or less)
	-1	Frequent instances of coprophagy (once/day or multiple times/week)

Animal Excellence Assessment Form

2018 Version

Animal(s) Assessed: _____

Date Assessed: _____

Animal Welfare is defined as an animal's collective physical, mental, and emotional states over a period of time, and is measured on a continuum from good to poor. The goal of this assessment form is to discover any deficiencies in animal welfare and identify any opportunities to promote ***Animal Excellence***, or optimal animal welfare. Those involved in the assessment should remain unbiased, pragmatic, and evidence-based in their approach as they discuss the inputs and outputs of animal welfare queried in this form.

Instructions: Upon discussion and consensus, check a response to the right of each question pertaining to the selected animals' welfare. Please note that some questions listed may not apply to all species or individuals. Other questions or parameters may be considered and should be commented on in pertinent sections of the assessment form.

Assessment Participants:

	Health and Nutrition	Yes	Somewhat	No	Not Sure
1.	Does the animal(s) show an *absence* of illness, disease, injury, or any behavior that indicates possible pain?	☐	☐	☐	☐
2.	Does the animal(s) demonstrate proper body orientation and righting reflex?	☐	☐	☐	☐
3.	Does the animal(s) demonstrate proper body part use (range of motion, *absence* of lameness)?	☐	☐	☐	☐
4.	Is each animal's beak/tusks/teeth in good condition?	☐	☐	☐	☐
5.	Is each animal's nails/hoofs/feet in good condition?	☐	☐	☐	☐
6.	Is each animal's fur/feathers/scales/fin/skin in good condition?	☐	☐	☐	☐
7.	Is there an *absence* of overgrooming and/or self-mutilation?	☐	☐	☐	☐
8.	Is the weight and body condition appropriate for the individual animal(s)?	☐	☐	☐	☐
9.	Is fecal form and urine output appropriate for the individual animal(s)?	☐	☐	☐	☐
10.	Are special needs met for the individual animal(s) (e.g., young, pregnant, geriatric)?	☐	☐	☐	☐
11.	Is each animal's diet nutritionally well-balanced (food and water), including appropriate vitamins and supplements?	☐	☐	☐	☐
12.	Is each animal's diet appropriately diverse (monotonous or varied forms, browse				
13	Is browse provided to the extent that is appropriate for the species?				
14.	Is appetite and water consumption appropriate for the individual animal(s)?				

1

Criteria to be evaluated by ACS husbandry and staff:
(This is based on a 10 elephant being a baseline "normal" animal)

Eating and Drinking

1 — 5 — 10

1= complete anorexia and/or refusing water
5= Eating more slowly than a normal elephant, may eat smaller amounts at a time and pause, still ultimately consumes complete regular base diet eventually and eat favorite treats well (bamboo, etc.) and/or appreciable decrease in water consumption
10= eating and drinking normally

Socialization with elephants

1 — 5 — 10

1= Non-responsive to other elephants
5= Socializes with herd well -with occasional avoidance of close proximity to other elephants, and/or occasionally seeks social engagement with bonded elephants
10= Normal socialization with other elephants, routinely seeks social engagement with bonded elephants

Keeper interactions

1 — 5 — 10

1= Non-responsive to commands or keeper attention
5= Sluggish to commands, reluctant to shift in routine conditions, but responsive to keeper attention
10= Normal interactions with keepers, responds to commands as a baseline elephant would

Activity/Personality

1 — 5 — 10

1= Non-responsive
5= mildly depressed but still performing some normal activities, abnormal response to external stimuli
10= Fully playful/full of personality/performing all normal activities for the elephant

6

RSPCA

Animal welfare assessment form

An RSPCA inspector has called to see: [animal(s) and location]
Horses, AFRICANO CIRCUS Bude,

on: [date and time] 4/6/11

Owner/person responsible: AMANDA SARDOW,

Contact number:

Below is the RSPCA inspector's view about how the animal(s) is/are being kept. If the inspector has written 'No' against any of the questions you need to do something for your animal's welfare.

To be completed by RSPCA inspector

	Need to provide a suitable diet	Yes No	Advice accepted
1	Does the animal have ready access to water?	Y	
2	Does the animal look like it is getting a nutritionally adequate diet to stay healthy?	Y	
	Need to have a suitable environment		
3	Is the animal contained within a suitable environment?	Y	
4	Is the environment clean?	Y	
5	Is the environment free from hazards?	Y	
6	Is there shelter from extremes of weather?	Y	
7	Is there a comfortable resting area?	Y	
	Need to be protected from pain, injury, disease and suffering (including fear and distress)		
8	Is the animal protected from pain, injury, disease or suffering?	Y	
9	Is the animal protected from fear and distress?		
	Need to exhibit normal behaviour		
10	Does the animal have the right environment to express its normal behaviour?	Y	
	Freedom to live with, or apart from, other animals		
11	Are the animal's specific social needs catered for?	Y	

Chief/Insp[redacted]

Number: [redacted] 4/6/11

Contact n[redacted]

Practice

- MANY options for assessment checklists
  - selection does not mean endorsement
  - Pick your own from the AWC or from the minds at your facility
- Nutritional welfare does not happen in a vacuum, BUT we do not all have the health / nutrition / environmental / behavioral / mental state evaluation expertise to complete a whole assessment.
- Focus on nutrition-related questions and what **TOOLS** we will use to make those assessments and answer the questions.
- “We don’t know what we can’t measure.”

Hypothetical 0.1 Creature

- “Older animal”
- Housed socially with 0.2 conspecifics, all younger
- Some evidence of arthritis
- Diet has been adjusted to include a “higher energy” pellet and pre-chopped hay
- Barn and yard access, sand stalls

What tools to use?

Question	yes	somewhat	no	not sure	comment
Does the animal have access to safe food and water?					
Is there competition or other factors impacting access?					
Is the animal eating?					
Does the diet meet animal needs as offered / as consumed?					
Is the animal maintaining appropriate weight and condition?					
Is the diet being appropriately digested/metabolized?					
Is the quantity of food appropriate?					
Is the timing and availability of food appropriate?					
Is there appropriate variety in the diet as offered/consumed?					
Is the diet offered so as to stimulate natural feeding behavior?					
Is safe browse offered with appropriate frequency?					
Does the animal exhibit presumed food-related stereotypic behavior?					

What tools to use?

Question
1 - Does the animal have access to safe food and water?
2- Is there competition or other factors impacting access?
3 - Is the animal eating?
4 - Does the diet meet animal needs as offered / as consumed?
5 - Is the animal maintaining appropriate weight and condition?
6 - Is the diet being appropriately digested/metabolized?
7- Is the quantity of food appropriate?
8- Is the timing and availability of food appropriate?
9 - Is there appropriate variety in the diet as offered/consumed?
10 - Is the diet offered so as to stimulate natural feeding behavior?
11 - Is safe browse offered with appropriate frequency?
12 - Does the animal exhibit presumed food-related stereotypic behavior?

Toolbox

Body weight measurement
Integument assessment
BCS
FCS
Diet ingredient quality, nutrient content
Diet consumption assessment
Diet formulation template / considerations
Diet evaluation and record keeping
Blood and tissue value assessment
Specialized assessments
Necropsy

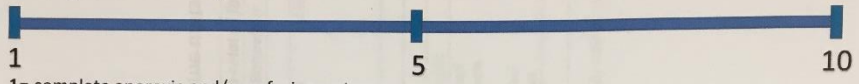
Once we use the tools, then what?

- Combine measures to make an assessment
- Use assessment to make a plan
  - Does diet need to change?
  - Combination of factors to adjust?
- How to summarize the results into something useful?
- No sense in putting in the effort, on any aspect, if they won’t be used/useful for something productive.

Criteria to be evaluated by ACS husbandry and staff:

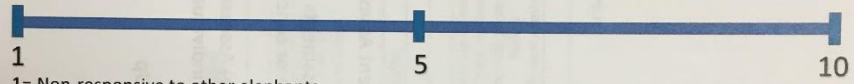
(This is based on a 10 elephant being a baseline "normal" animal)

Eating and Drinking



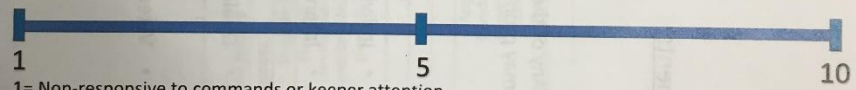
1= complete anorexia and/or refusing water
5= Eating more slowly than a normal elephant, may eat smaller amounts at a time and pause, still ultimately consumes complete regular base diet eventually and eat favorite treats well (bamboo, etc.) and/or appreciable decrease in water consumption
10= eating and drinking normally

Socialization with elephants



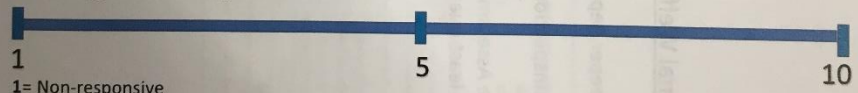
1= Non-responsive to other elephants
5= Socializes with herd well -with occasional avoidance of close proximity to other elephants, and/or occasionally seeks social engagement with bonded elephants
10= Normal socialization with other elephants, routinely seeks social engagement with bonded elephants

Keeper interactions

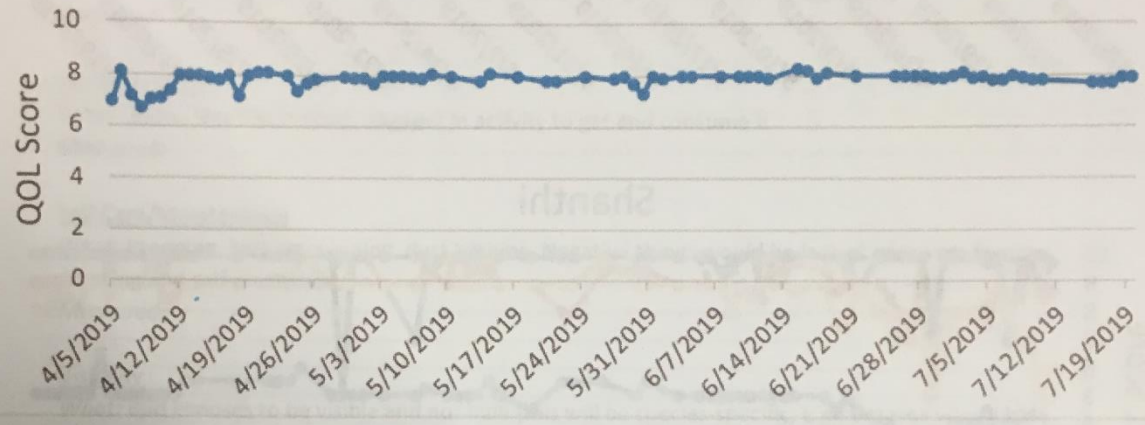


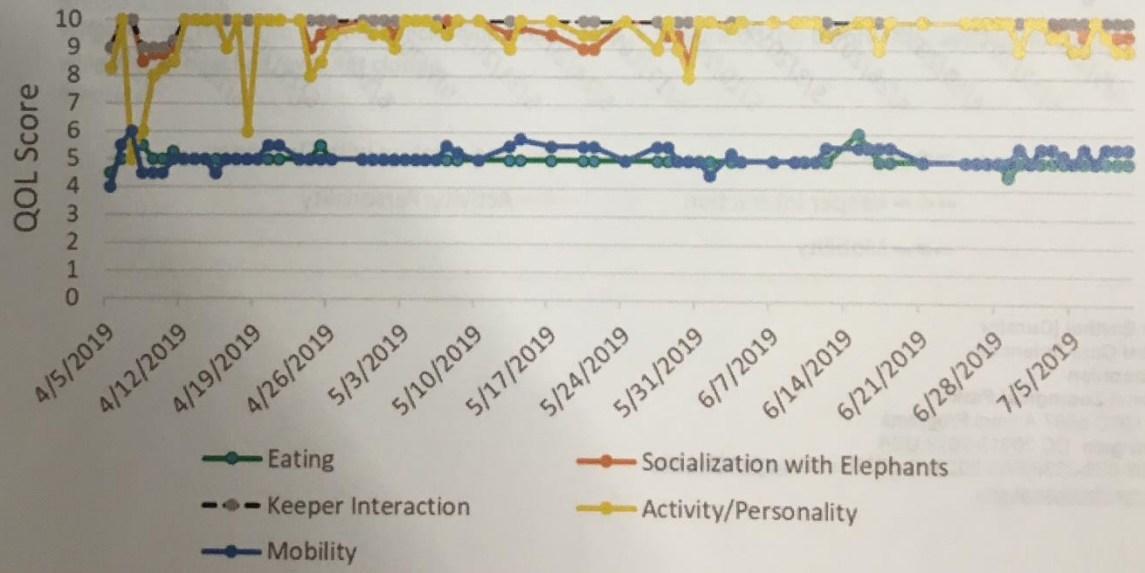
1= Non-responsive to commands or keeper attention
5= Sluggish to commands, reluctant to shift in routine conditions, but responsive to keeper attention
10= Normal interactions with keepers, responds to commands as a baseline elephant would

Activity/Personality



1= Non-responsive
5= mildly depressed but still performing some normal activities, abnormal response to external stimuli
10= Fully playful/full of personality/performing all normal activities for the elephant





Hypothetical 0.3 GROUP of creatures

- Same social housing
- 1 older, 2 middle aged
- Same diet access (regular diet, chipped hay, supplements)
- Condition variable across group

Does a GROUP assessment change the answers? How?

What tools to use?

Question
1 - Does the animal have access to safe food and water?
2 - Is there competition or other factors impacting access?
3 - Is the animal eating?
4 - Does the diet meet animal needs as offered / as consumed?
5 - Is the animal maintaining appropriate weight and condition?
6 - Is the diet being appropriately digested/metabolized?
7 - Is the quantity of food appropriate?
8 - Is the timing and availability of food appropriate?
9 - Is there appropriate variety in the diet as offered/consumed?
10 - Is the diet offered so as to stimulate natural feeding behavior?
11 - Is safe browse offered with appropriate frequency?
12 - Does the animal exhibit presumed food-related stereotypic behavior?

Toolbox

Body weight measurement
Integument assessment
BCS
FCS
Diet ingredient quality, nutrient content
Diet consumption assessment
Diet formulation template / considerations
Diet evaluation and record keeping
Blood and tissue value assessment
Specialized assessments
Necropsy

1.0 tortoise

- Adult male, 25 years old, diminished muscle tone
- Socially housed with 15 conspecifics
- Gravel yard
- Offered two different browse plants four days a week
- Group fed

What tools to use?

Question
1 - Does the animal have access to safe food and water?
2 - Is there competition or other factors impacting access?
3 - Is the animal eating?
4 - Does the diet meet animal needs as offered / as consumed?
5 - Is the animal maintaining appropriate weight and condition?
6 - Is the diet being appropriately digested/metabolized?
7 - Is the quantity of food appropriate?
8- Is the timing and availability of food appropriate?
9 - Is there appropriate variety in the diet as offered/consumed?
10 - Is the diet offered so as to stimulate natural feeding behavior?
11 - Is safe browse offered with appropriate frequency?
12 - Does the animal exhibit presumed food-related stereotypic behavior?

Toolbox

Body weight measurement
Integument assessment
BCS
FCS
Diet ingredient quality, nutrient content
Diet consumption assessment
Diet formulation template / considerations
Diet evaluation and record keeping
Blood and tissue value assessment
Specialized assessments
Necropsy

Applying at Home

What questions will best help us assess nutritional welfare?

Develop an evaluation template with the questions and measureable / objective responses.

What tools / techniques do you have available to provide those responses?

Establish a time frame and/or set of criteria for evaluation and re-evaluation. How often? In what cases (physiology/health changes, exhibit changes, daily/weekly/monthly/annually / 5 year cycle, around specific events – construction, etc).