Objectives

- Nutritional strategies, foraging
- Nutritional history, PE
- Dietary conversion
- Unsafe foods for birds
- Clinical concerns
Nutritional strategies

FLORIVORES
• Granivores
• Nectarivores
• Frugivores
• Cross-over species
Nutritional requirements

- Vary with the species of birds and their needs
Seed-only diets

Oil seeds => 50% fat:
- Energy ↑
- Protein ↑
- Omega 6 FAs ↑
- Vit E ↑
- Ca ↓
Seed-Only Diet

- Non-oil Seeds:
  - Millet, ground foraging species
  - Lower fat
  - Higher in starch
Self balancing diets? in the wild

- Energy
- Amino acids
- Calcium
Self balancing diets? in captivity

- Grey parrots were deficient in 12 dietary components
- Provided veggies and variety
- Seeds and pellet to “balance”
Seeds from domestic plants lead to nutritional imbalances

- More concentrated in energy
- Ingestion of excessive oil seeds > weight gain
- Lower in protein
- Deficient in many other essential nutrients, including vitamins A, D3, E and K, certain amino acids, calcium, and other minerals
- Grains such as millet, canary seeds, and corn are especially low with less than 0.03% calcium.
- Excessive millet > Poor BCS

**Table 4**

<table>
<thead>
<tr>
<th></th>
<th>Ca</th>
<th>Total P</th>
<th>Phytate</th>
<th>Available P</th>
<th>Ca:avail P</th>
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<tbody>
<tr>
<td>White millet</td>
<td>0.15</td>
<td>2.6</td>
<td>2.6</td>
<td>0.10</td>
<td>1.5</td>
</tr>
<tr>
<td>Red millet</td>
<td>0.13</td>
<td>2.5</td>
<td>2.1</td>
<td>0.40</td>
<td>0.33</td>
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<tr>
<td>Canary</td>
<td>0.41</td>
<td>4.1</td>
<td>3.0</td>
<td>1.10</td>
<td>0.37</td>
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<tr>
<td>Groats(^1)</td>
<td>0.44</td>
<td>3.4</td>
<td>2.3</td>
<td>1.10</td>
<td>0.40</td>
</tr>
</tbody>
</table>

\(^1\) Hulled oats.

From Earle & Clarke 1991 via Koutsos 2001
Attempts have been made to correct the imbalances of commercial seed mixes

- Seed coatings: remove husks
- Supplemented pellets – only 11%
Sunflower hearts are a good short-term, energy-dense food for hospitalized “seed junkies”

- Can be used for treats after exams
- Show training ideas
Formulated diets

- Grains: basis of the diet
- fortified with amino acids
- vitamins
- minerals
Pellets

Ground grains and a vitamin-mineral premix put through a hammer mill to ensure appropriate particle size, then forced under heat (70-80ºC) through a die to produce a pellet shape.
Extruded diets

Mixture of ground grains and vitamin/minerals forced through an extruder under pressure and subjected to higher temperatures (90-180ºC)
Problems associated with formulated diets

**RELUCTANCE**
- Seed-adapted birds are reluctant to switch diets
- Protocols for dietary conversion

**LACK OF ENRICHMENT**
- The uniformity of pellets means that every bite tastes & feels the same

**SMALL PARTICLE SIZE**
- Exception: HBD
SOLUTION:
Fortified whole-seed diets

NUTRI-BERRIES

AVI-CAKES
SOLUTION:
Fortified whole-seed diets

- Foot-friendly shapes
- Promote dietary conversion
- Tips
  - Crumble (on a flat surface)
  - Offer different sizes
  - Foraging
Nutritional equivalency of a fortified whole-seed diet compared to a pelleted diet for companion birds

- University of California at Davis
- Cockatiels fed a pelleted diet compared to cockatiels fed NBs
- At the conclusion of the study, nutrition & health parameters of the birds in both groups were the same
- HOWEVER birds fed NBs, spent twice as much time in feeding-related activities
When compared to pellets, NBs promoted twice the foraging time

<table>
<thead>
<tr>
<th>Foraging activities (min/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pellets</td>
</tr>
<tr>
<td>Nutri-Berries</td>
</tr>
</tbody>
</table>

Foraging

- The act of searching for and obtaining food
- Wild birds: 40%-75% or 4-8 hours/day
- Captive birds: Foraging is a behavioral need

SOLUTION:
Foraging behaviors in psittacine birds

- **Hypothesis:** repertoire of parrots
  - Highly motivated to search for, access and process food

- **Coulton et al. (1977)**
  - Contra-freeloading in captive parrots

- **Reduced FDB, Orange winged Amazons**
  - Link food with objects
    - Meehan et al. (2003)
Most owners employ a variety of strategies:

- Formulated diets
- Pellets
- Extruded foods
- Fortified whole-seed diets
- Seeds/nuts
- Fruits & vegetables
Other considerations

- GI tract of the species
- Muscle layers of the gizzard
- Pocketing affects microbiome
Why is the nutritional history important?
Determine exactly what the patient is fed & in what proportions

- Is the bird getting excessive, adequate, or inadequate levels of...
  - Fat?
  - Vitamins A,D3,K?
  - Protein?

- How often is the patient fed?

- At what time of day fed?

- How is food presented?

- Are any vitamin or mineral supplements provided? And if so, how often and in what quantity?

- Treats?

- What is the water source?

- What types of water containers are used?

- How often is water changed?
Who is the primary caretaker?

- If this individual is unavailable, send the dietary history form home
- Owners often change hx between tech and vet
Physical exam findings

- Plumage
- Long bones
- BCS

https://lafeber.com/vet/body-condition-scoring/
Protein and amino acids

- Cysteine, amino nitrogen
- Deficiencies
  - Reduced growth rates, skeletal muscle deposition
  - Methionine-dark stress bars
  - Specific aa deficiencies, no FDB
Vitamin A deficiency

- Cockatiels: 2,000-10,000 IU/kg
  - Impaired immune function when absent

Deficiency:
- Keratinization, mucous membranes
- Focal metaplasia, salivary glands
- Blunting, choanal papillae
Vitamin D deficiency

- Calcium uptake
- Egg binding
- Pathologic fractures
Body condition

https://lafeber.com/vet/body-condition-scoring/
Before converting a bird to a healthy diet...

- Complete physical exam
- Body condition score
- Body weight
Dietary conversion: Good transitional foods
Dietary conversion

- Gradually offer more nutritious foods
- Sweet potato
- Carrots
- Dark, leafy greens
- Peppers
- Green beans
- Pumpkin
- Walnuts
- Flax seed
Dietary conversion

- Gradually offer more nutritious foods
- Monitor BW, droppings
- Gradual process
- Varies based on the species and the owner

Dr. Christal Pollock
Dietary conversion: TIPS & TRICKS

- Variety of colors, shapes & textures
- Large chunks
- Drama, enthusiasm (social eaters)
- Formulated diet crumbled onto flat surface (pecking, ground feeders)
- Favorite meal

- Winding greens through cage bars
- Leaf bathing
- Kabobs
- Model/rival technique
- Offer choices
- Large parrots: BID meals
- Feeder puzzles
Dietary conversion: CAUTIONS

- A wide variety of foods
- Soft, warm foods

>>> May promote reproductive activity
Unsafe foods for birds

The Challenges
Unsafe foods for birds

Food that...

- Should NEVER be fed to birds
- Are NOT RECOMMENDED
- Can be fed with CAUTION

The Challenges
Foods that should NEVER be fed to birds
Foods that should NEVER be fed to birds

- Plants
- Nuts
- Candy
Foods that are NOT RECOMMENDED but are sometimes fed without incident
Foods that can be fed to birds with CAUTION
Clinical concerns

Clinical Management:

- Obesity
- GI disease
- Renal disease
- Hepatic disease (iron overload)
Obesity

- High fat diet
- Excess calorie intake
- Insufficient exercise
- Species predisposition
Potential health risks of obesity

- Lipoma
- Xanthomatosis
- Osteoarthritis
- Hepatic lipidosis
- Diabetes mellitus
- Renal disease
- Herniation
- Cardiovascular disease
- Respiratory compromise (air sac compression)
- Hypertension
- Atherosclerosis
- Egg binding
- Dystocia
- Cloacal prolapse
- Infertility
Weight loss program

Complete physical exam
Weight loss program

Effective communication

- Understanding
- Commitment
- Motivational factor(s)
- ID potential obstacles
Weight loss program
Formulated diets

2826 ME kcal/kg
2858 ME kcal/kg
“Occupational therapy”: Physical activity

- Occupational therapy
- Foraging important
- Physical activity
- Cardiac workup
- Wing flapping or flying
  - 11-20 X MBR
Weight loss program

- Careful monitoring
  - Schedule regular follow-up visits
  - Monitor progress: body condition
  - Recheck at appropriate intervals:
    - Tend to slide back
    - Re-ask questions about diet each visit
Gastrointestinal disease

- High-energy, low-fiber diet
- Easily digestible protein
- Simple sugars
- Glutamine
- Substitute MCT for fat when possible
Avian Ganglioneuritis (avian bornavirus)

- Maldigestion/ malabsorption
- Vitamin/mineral supplements:
  - Vitamin E: 0.06 mg/kg IM q 7 d
- Highly Digestible: Emeraid

Images: Dr. Greg Rich
Avian Ganglioneuritis (avian bornavirus)

- Gavage feeding elemental diet:
  - Di and tripeptides
  - Iso-amino acids
  - Easily digestible fats
  - ↑ energy
  - ↓ energy, assimilation
Nutrition for critical care

Resources on LafeberVet

- **Critical Care Nutrition** (WEBINAR RECORDING)
- **Nutritional Support to the Critical Exotic Patient** (WEBINAR RECORDING)
- **Tube Feeding Birds** (VIDEO)
Renal disease

- Causes of renal disease/nephritis largely unknown
- Often thought like dogs: excess dietary protein or Ca, vitamin D
  - Excess protein, not a cause
- Ensure adequate hydration
- Correct nutritional imbalances
- Omega-3 FA supplementation
- Vitamin C supplementation
Iron

- Hemoglobin
- Cofactor, enzymes
- Chromophore, red and black pigments
Iron

- Active transport, small intestine
- Mucosal block occurs in most psittacines except upper tree story birds:
  - Toucans
  - Toucanets
  - Lories
  - Lorikeets
- Selective uptake, iron poor environments
Hemosiderosis

- Deposition of hemosiderin is normal in the liver, spleen, bone marrow & reticulocytes
- Occurs in many captive bird species
- Liver, associated, stress
- Common finding at necropsy
Hemochromatosis

- Iron storage disease/iron overload
- Excess accumulation parenchyma
  - Liver
  - Heart
  - Spleen
Hemochromatosis

Iron storage disease/iron overload
Excess accumulation parenchyma
Liver
Heart
Spleen

Aracari
Bird of paradise
Hornbill
Mynah bird
Starling
Tanager
Toucan
Toucanette

Owls
Waterfowl
Flamingos
Go-away birds
Quetzals

Black lory
Blue-fronted Amazon
Citron-crested cockatoo
Duyvenbodie’s lory
Hawk-headed parrot
Macaws, several spp.
Rainbow lory
Iron storage disease
Feed low-iron diet

<table>
<thead>
<tr>
<th>Pet Bird Food</th>
<th>Iron content (mg/kg as fed)*</th>
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<tbody>
<tr>
<td>Classic Nutri-Berries Macaw</td>
<td>111</td>
</tr>
<tr>
<td>Classic Nutri-Berries Parrot</td>
<td>165</td>
</tr>
<tr>
<td>Classic Nutri-Berries Cockatiel</td>
<td>108</td>
</tr>
<tr>
<td>Classic Nutri-Berries Parakeet</td>
<td>99</td>
</tr>
<tr>
<td>Premium Daily Diet Pellets Macaw</td>
<td>184</td>
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<tr>
<td>Premium Daily Diet Pellets Parrot</td>
<td>170</td>
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<tr>
<td>Premium Daily Diet Pellets Cockatiel</td>
<td>207</td>
</tr>
<tr>
<td>Premium Daily Diet Pellets Parakeet</td>
<td>200</td>
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</tbody>
</table>
Management

- Reduce or eliminate meat products
- Ascorbic acid may increase iron absorption
  - 100 mg/kg/day
- Non-caffeinated teas
- Low-iron pellets/nectars
- Blood removal
What we all want

- Muffy at 28! Happy and Healthy!
Recommended resource

Well-developed third eyelid