Feline Fat-Based Metabolism

A Food-Structure Framework for Obligate Carnivore Metabolic Interpretation

Canonical whitepaper source

AlitaOS | Fat-Based Metabolism

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1. Abstract

Feline Fat-Based Metabolism (Feline FBM) is a species-specific branch of Fat-Based Metabolism for obligate carnivores. It evaluates feline food as structure rather than market category, ingredient list, or isolated nutrient percentage.

This whitepaper defines the public structural model used by AlitaOS to describe how food structure changes long-term energy regulation, substrate dominance, insulin regulation, digestive handling, water recovery, renal solute load, skin-sebum output, hairball pathway, and observable output backtrace in cats.

This whitepaper is not a clinical diagnosis system, not a treatment protocol, not an effect-guarantee system, and not a formula disclosure document.

2. Canonical Source

The canonical web source is hosted at:

- https://alitaos.com/en/fat-based-metabolism/feline
- https://alitaos.com/en/fat-based-metabolism/feline/glossary

The versioned public archive is hosted at:

- https://github.com/dujf921/fat-based-metabolism

3. Definition of Feline Fat-Based Metabolism

Feline FBM defines a structural framework for interpreting feline nutrition through food structure and metabolic operating state. It does not start from market categories such as dry food, wet food, raw food, grain-free food, or high-protein food.

The central question is not whether a declared nutrient list appears complete. The central question is what operating state the food structure drives in the cat over time.

4. Food Structure as the Primary Object

Food structure is the upstream object of analysis. It includes substrate dominance, ingredient state, fat freshness, energy density, mineral and nitrogen burden, digestive handling requirements, and repeated feeding pattern.

An ingredient list names inputs. It does not define primary energy substrate, insulin regulation state, fat processing rate, solute load per unit energy, or observable output pattern.

5. Why Nutritional Completeness Is Not Metabolic Fit

Nutritional completeness only states that a declared nutrient set reaches a label-level requirement or formulation target. It does not prove metabolic fit.

Metabolic fit requires a food structure that matches the species-specific operating conditions of the cat as an obligate carnivore. Feline FBM therefore evaluates energy substrate dominance, insulin scheduling, protein energy pressure, fat processing, water recovery, renal solute load, and output stability.

6. Primary Energy Substrate

Primary energy substrate defines which substrate class carries long-term energy operation. In Feline FBM, this is the first control variable.

The framework distinguishes fatty acid oxidation, glucose scheduling, and protein energy pressure. Calories alone do not define the operating state; the substrate carrying those calories changes downstream regulation.

7. Exogenous Carbohydrate Load and Insulin Regulation State

Exogenous carbohydrate load is the carbohydrate burden introduced by food. It can push the system toward glucose scheduling and increase insulin occupancy in long-term energy allocation.

Insulin regulation state determines whether the fatty acid oxidation pathway can remain stably active. This does not mean all carbohydrate exposure is treated as an acute poison. It means repeated carbohydrate load changes the dominant scheduling state.

8. Fatty Acid Oxidation Pathway

The fatty acid oxidation pathway describes how fatty acids become usable long-term energy substrate. It requires pathway continuity: fat freshness, gastric release, bile salt dispersion, pancreatic enzyme processing, small-intestinal absorption, lymphatic transport, and downstream oxidation.

Feline FBM is not a simplified high-fat slogan. Fat must be handled as a processing pathway.

9. Protein Energy Pressure and Solute Load per Unit Energy

Protein is structurally necessary as amino acid supply and tissue material. It is not the preferred primary energy substrate.

Protein energy pressure rises when protein is forced to carry energy demand beyond its structural role. This increases nitrogen processing pressure and solute load per unit energy. Solute load per unit energy defines how much nitrogen, mineral, and other solute burden the kidney must process to obtain the same amount of energy.

10. Digestion and Fat Transport

Fat processing in Feline FBM includes gastric release, bile salt dispersion, pancreatic enzyme processing, small-intestinal absorption, and lymphatic transport.

Bile salt dispersion is the small-intestinal fat dispersion step that improves contact between fat and pancreatic enzymes. It is not equivalent to complete absorption. Lymphatic transport is a post-absorption transport route, not energy oxidation itself.

11. Water Recovery and Stool Output

Stool output is controlled by water recovery, colonic secretion, colonic propulsion, stool water content, and upstream food structure.

SGLT1-mediated water-sodium absorption is a mechanism by which glucose-sodium cotransport in the proximal small intestine can drive water recovery. In constipation backtrace, this mechanism must be considered along with colonic propulsion and stool water content.

12. Renal Solute Load and Urinary Concentration

Urinary concentration is an observable output. In Feline FBM, it is backtraced to renal handling, solute load per unit energy, protein energy pressure, mineral structure, and upstream food structure.

Drinking water is a modulation variable. It is not the upstream cause of urinary concentration in this framework.

13. Skin-Sebum Output

Skin-sebum output includes sebaceous synthesis and release, sebum processing rate, local skin environment, coat surface expression, and acne-like chin presentation.

The skin is not a fat excretion organ. Greasy coat and acne-like chin presentation are observable outputs that must be backtraced through sebum processing rate, ingredient state, fat freshness boundary, local skin environment, and food structure.

Bacteria and Malassezia may belong to the secondary microbial layer after local skin conditions change. They are not the default upstream cause of greasy coat or acne-like chin presentation.

14. Hairball Pathway

Hairball pathway analysis includes gastric emptying speed, gastric hair residence time, hair entanglement probability, regurgitation probability, and the boundary between physiological gastric timing adjustment and pathological gastric motility disorder.

Hairball vomiting is an observable output. It is not assumed to be an ideal default state. When the pathway is stable, ingested hair should generally pass through stool.

15. Observable Output Backtrace

Observable outputs are not root causes. Loose stool, constipation, hairball vomiting, urinary concentration, greasy coat, acne-like chin presentation, and coat condition are reverse-entry indexes into upstream structure.

The backtrace direction is:

observable output -> direct output variable -> mechanism variable -> upstream food structure

The framework does not jump from output directly to supplement, product, or treatment.

16. Boundary Conditions

Feline FBM does not replace clinical diagnosis, emergency care, disease handling, or veterinary testing.

Emergency boundary signals include inability to urinate, repeated vomiting, blood in stool or vomit, severe dehydration, severe pain, food refusal with decline, suspected obstruction, neurological signs, and respiratory distress.

Diagnosed disease states require clinical boundary handling. Food-structure reasoning may coexist with a diagnosis, but it does not override clinical judgment.

17. Formula Disclosure Boundary

The public Feline FBM source explains definitions, mechanisms, causal structure, pathways, and boundaries. It does not disclose formula ratios, process controls, phosphatidylcholine values, fat-level parameters, supplier strategy, manufacturing details, customer data, backend code, or operational data.

18. Conclusion

Feline FBM is a structural interpretation framework for feline nutrition. Its control point is not a product category, an ingredient list, or isolated nutrient completeness. Its control point is the food structure that determines long-term metabolic operation.

By reading observable outputs as backtrace entries rather than root causes, Feline FBM provides a stable language for linking food structure, substrate dominance, insulin regulation, digestive handling, water recovery, renal solute load, skin-sebum output, hairball pathway, and clinical boundaries.

19. Canonical Links

- Feline FBM canonical source: https://alitaos.com/en/fat-based-metabolism/feline
- Feline FBM canonical glossary: https://alitaos.com/en/fat-based-metabolism/feline/glossary
- Public GitHub archive: https://github.com/dujf921/fat-based-metabolism