LITHOLIFE®

Marine-Derived Multimineral Calcium for Modern Pet Nutrition

A technical review of uses, nutritional value, differentiation, safety and U.S. market considerations for dog and cat foods, treats and supplements

A naturally occurring calcium–magnesium matrix from 100% Lithothamnion calcareum, standardized and controlled lot by lot for responsible formulation.

Technical knowledge article for the pet nutrition industry
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Executive overview

Pet-food formulators do not need calcium in isolation; they need a predictable, safe and commercially meaningful mineral system. Litholife is a minimally processed, marine-derived ingredient composed of 100% Lithothamnion calcareum. Its specification provides 30–36% elemental calcium and 2–4% magnesium in a naturally occurring mineral matrix, with iron and other trace constituents present at lot-dependent levels. The ingredient is neutral in odor and taste, available in multiple particle sizes, and supported by lot-release controls for identity, calcium, magnesium, microbiology and inorganic contaminants.

The strongest value proposition is therefore not an unsupported promise that algae calcium is universally “more bioavailable.” It is a defensible combination of concentrated calcium, meaningful magnesium co-delivery, clean-label origin, formulation flexibility, documented quality controls and an engaging marine-mineral story. Published evidence supports Lithothamnion as a viable calcium source in animal feeding and demonstrates pH-dependent mineral solubilization; however, direct canine and feline efficacy data on Litholife itself are not yet available. Product claims should remain within this evidence boundary.

Commercial need	Litholife response
Reliable mineral fortification	30–36% Ca and 2–4% Mg; formulate from the actual lot Certificate of Analysis (CoA).
Clean-label differentiation	100% calcified red-algae material; no formulation additives, GMO ingredients, pesticides or ionizing-radiation treatment declared.
Multiple product formats	Particle-size options from granulated material for compression to micronized grades for powders, premixes and dispersions.
Safety documentation	Lot testing for key pathogens, microbial indicators and As/Cd/Pb/Hg, plus allergen controls and 48-month shelf life.
Responsible U.S. positioning	Nutritional and technical claims can be developed; disease-treatment claims and ingredient legal status require U.S. regulatory confirmation.

U.S. COMMERCIAL QUICK REFERENCE

Pet Nutrition | Prepared for Unichem's U.S. market development team

This section consolidates the six information categories requested by Unichem. It should be read together with the full technical article, current specification, lot Certificate of Analysis and current certificates.

Unichem request	Litholife response
1. Key technical differentiators and benefits	30–36% elemental calcium plus 2–4% naturally accompanying magnesium; 100% Lithothamnion calcareum; neutral sensory profile; multiple grades for foods, treats, premixes and supplements; lot-level composition, microbiology and As/Cd/Pb/Hg controls; 48-month shelf life.
2. Clinical, scientific or application data	Published animal research supports Lithothamnion as a viable calcium source and reports higher in-vitro solubility than limestone in one piglet study, without superior in-vivo calcium digestibility. Acid-dependent calcium/magnesium solubilization is documented. Direct Litholife canine/feline efficacy trials are not currently available; therefore, do not claim superior absorption or clinical outcomes in dogs or cats.
3. Competitive positioning	Versus commodity calcium carbonate, Litholife adds marine-algae provenance, meaningful magnesium co-delivery, multiple particle-size options and an organic/certification story. Versus calcium citrate, it generally provides higher elemental calcium density but is water-insoluble and requires formulation management. Final comparison depends on grade, cost-in-use, Ca target and process.
4. U.S. regulatory status	Do not state "FDA approved." Before U.S. sale, confirm the lawful animal-food ingredient pathway and common/usual or AAFCO-recognized name for the intended use, plus state registration and labeling requirements. Human-food use or USDA Organic certification does not by itself establish animal-food ingredient status. Organic claims on finished pet products require separate certification review.
5. Applications and suggested use	No universal inclusion rate is appropriate. Calculate: required Litholife (%) = desired added calcium (%) ÷ actual lot calcium fraction. Example: at 35% Ca, 1.00% Litholife contributes about 0.35 percentage points calcium; adding 0.50 percentage points calcium requires about 1.43% Litholife. Recalculate total Ca, P, Mg, energy basis and Ca:P ratio for species/life stage; validate palatability, homogeneity and process performance.
6. Supported marketing claims	Recommended territory: "marine-derived calcium source," "provides calcium with naturally accompanying magnesium," "from 100% Lithothamnion calcareum," and verified certification/process facts. Substantiate strong-bone, bioavailability, palatability, texture or urinary claims with appropriate finished-product evidence. Avoid disease prevention/treatment, arthritis, fracture, osteoporosis and urinary-stone claims.

Claim-use discipline

Claims should match the evidence level of the exact ingredient and finished product. Category-level Lithothamnion research supports technical plausibility but is not automatically Litholife-specific clinical proof. Disease-treatment claims are outside the recommended territory.

Documents to accompany customer discussions

Current technical specification for the proposed grade

Representative and shipment-specific Certificate of Analysis

Current USDA Organic, Kosher, Vegan, Halal and GMP documentation, as applicable

Safety, allergen, non-GMO, contaminant and microbiological documentation

Full segment technical article and cited scientific references

1. Ingredient identity: a biomineral matrix, not a single-mineral commodity

Lithothamnion calcareum is a calcified coralline red alga. During growth, calcium and magnesium carbonates become incorporated into its structure. The harvested, dried and milled material is therefore best described commercially as a marine-derived multimineral matrix whose principal nutritional function is supplying calcium, with magnesium and trace constituents naturally accompanying it.

Litholife's current technical specifications describe approximately 85% calcium carbonate, 11.5% magnesium carbonate and 3.5% other constituents. The guaranteed working ranges—not broad marketing averages—are the correct basis for pet-food formulation.

Parameter	Litholife specification / characteristic	Formulation relevance
Identity	100% Lithothamnion calcareum	Single-source marine ingredient; confirm U.S. common/usual or AAFCO-recognized ingredient name before label launch.
Elemental calcium	30.0–36.0%	Concentrated calcium input; inclusion must be calculated from lot assay.
Elemental magnesium	2.0–3.5% (325 mesh); 2.0–4.0% (550 mesh)	Meaningful co-delivery; include in the finished formula's total magnesium balance.
Iron	Minimum 400 mg/kg in specifications	Can contribute iron, but natural variability means it should not automatically replace a controlled iron premix.
pH (analytical suspension)	8.5–10.5	Relevant to processing trials; not evidence by itself of an in-vivo buffering claim.
Solubility	Insoluble in water; soluble in weak acids	Supports acid-mediated mineral release; dispersion is not the same as dissolution.
Sensory	Fine beige homogeneous powder; neutral odor and taste	Useful in palatability-sensitive powders, treats and complete foods, subject to finished-product testing.

2. Nutritional value for dogs and cats

2.1 Calcium: essential, powerful and formulation-dependent

Calcium is essential for skeletal mineralization and maintenance, neuromuscular function, cell signaling and other normal physiological processes. In pet food, the ingredient's value is realized only when total dietary calcium is balanced against phosphorus, energy density, life stage and other calcium-contributing raw materials. Litholife enables precision because its elemental calcium range is defined and each commercial lot can be released with an assay.

A simple formulation equation is:

Required Litholife inclusion (%) = desired added calcium (%) ÷ lot calcium fraction

Example: using a lot assayed at 35% Ca, adding 1.00% Litholife contributes approximately 0.35 percentage points of calcium and, if that lot contains 3.2% Mg, approximately 0.032 percentage points of magnesium. To contribute 0.50 percentage points of calcium, the theoretical inclusion is 0.50 ÷ 0.35 = 1.43%. This is an illustration—not a universal recommendation—because native calcium, phosphorus, moisture, ash, energy density and processing losses must be included in the final calculation.

2.2 Magnesium and trace constituents: co-delivery with accountability

Magnesium supports normal enzyme activity, neuromuscular function and mineral metabolism. Litholife's calcium-to-magnesium ratio is approximately 8:1 to 18:1 across specification extremes, so its magnesium contribution can be nutritionally relevant. This can simplify a mineral story, but it does not eliminate the need for a complete vitamin-mineral premix or finished-product verification.

The broader trace-mineral profile is a differentiation opportunity when supported by current batch data. Because Lithothamnion is a natural material, trace constituents vary. Claims such as "70+ minerals" should be treated as compositional storytelling rather than a guarantee that every mineral is present at a nutritionally meaningful or bioavailable level. Only guaranteed or tested analytes should drive nutrient claims.

2.3 What the animal evidence does—and does not—show

A controlled piglet study compared calcitic Lithothamnion calcareum with calcitic limestone. Apparent and true calcium digestibility and daily calcium balance were not different between sources; growth outcomes were generally similar, while the algal material showed 1.9-fold higher in-vitro solubility. The authors concluded that Lithothamnion had potential to replace limestone as an alternative calcium source. This is useful animal-nutrition evidence of viability, but it is not a dog or cat trial and does not prove superiority in companion animals.

Laboratory research also demonstrates that release of calcium and magnesium from Lithothamnion is strongly pH-dependent. That finding is mechanistically relevant because the ingredient is acid-soluble, but in-vitro solubility cannot be converted directly into a numerical canine or feline bioavailability claim. Mouse studies involving a different branded Lithothamnion-derived multimineral extract provide supportive biological plausibility for bone-related research, not product-specific proof for Litholife or for commercial pet claims.

3. Application platforms

Platform	Role and opportunity	Development priorities
Dry extruded food	Calcium fortification plus magnesium co-delivery; premium marine-mineral story.	Premix uniformity, extrusion behavior, ash target, Ca:P balance, kibble color and palatability.
Wet food / pâté	Mineral fortification with fine-particle grades.	Dispersion, sedimentation, retort stability, package fill uniformity and sensory validation.
Baked treats / biscuits	Mineral enrichment; potential contribution to dough structure from a fine mineral solid.	Bench trials for hardness, breakage, color and palatability; avoid claiming texture benefits without product data.
Soft chews	Compact calcium-magnesium delivery and clean-label story.	Water activity, homogeneity, grit perception and serving-size accuracy.
Powder toppers / meal balancers	Direct mineral supplementation for professionally formulated diets.	Clear dosing, scoop variability, warnings against adding to already complete diets without need.
Tablets / compressed chews	100-mesh granulated option may support compression; 325/400-mesh grades suit finer blends.	Flow, compressibility, friability, disintegration and content uniformity.
Capsules / sachets	Concentrated calcium source with neutral sensory profile.	Fill weight, flow, target dose, species/life-stage instructions and mineral guarantees.
Premixes for manufacturers	Standardized calcium input with differentiated origin.	CoA-based potency correction, blending sequence, segregation control and retain samples.

4. Particle-size toolbox

Litholife can supply 100, 325, 400, 550 and 1,250 mesh options. Mesh labels alone do not fully describe a particle-size distribution, so customers should use the current specification and validate each process. Practical positioning is:

- 100 mesh: granulated material positioned for direct compression and applications where flow is more important than very fine dispersion.
- 325 and 400 mesh: versatile grades for dry blends, capsules, tablets, treats and many conventional pet-food systems.
- 550 mesh: fine grade (current specification: 95–98% passing) suited to finer premixes, soft chews and dispersion-sensitive formats.
- 1,250 mesh: development option for systems requiring very fine particles; performance must be confirmed for dusting, flow, wetting and suspension stability.

For U.S. commercialization, particle-size nomenclature should be supplemented with an agreed test method and distribution limits (for example, sieve or laser-diffraction data) when process consistency depends on more than a single pass-through criterion.

5. Differentiation that matters to pet brands

Differentiator	Defensible message	Guardrail
Marine multimineral origin	Provides concentrated calcium with naturally accompanying magnesium and trace constituents.	Do not imply every trace element is essential, absorbable or present at claim level.
Minimally processed	Dried and milled without formulation additives; declared non-GMO, pesticide-free and non-irradiated.	Use “natural” only after label counsel confirms the finished formula complies with applicable AAFCO/state conventions.
Neutral sensory profile	Designed to integrate without a strong odor or flavor contribution.	Finished-product palatability and flavor-release testing remain necessary.
Format flexibility	Multiple grades support foods, treats, powders, capsules and compressed formats.	Match grade to equipment and confirm homogeneity.
Quality documentation	Defined composition, 48-month shelf life and lot-level contaminant/microbiology program.	U.S. buyer specifications may require different limits, methods, sampling plans or FSMA documentation.
Certification platform	USDA Organic certification, Kosher and Vegan certifications are documented for current ingredient specifications; GMP and Halal are described in company materials.	Verify certificate scope, validity, logo permissions and applicability to pet food before any customer or label use.
Supply story	25-kg industrial packaging; multiple sizes; scalable sourcing and processing.	Commercial lead time and available grades should be confirmed in each quotation.

5.1 USDA Organic certification: a significant market differentiator

Litholife’s ingredient is certified to the USDA National Organic Program through IBD, with annual certification oversight documented by the company. This is especially relevant in a market where pet owners increasingly seek transparent sourcing, recognizable ingredients and independently verified production standards. The certification distinguishes Litholife from conventional mined calcium carriers and gives formulators a credible, third-party-verified organic ingredient platform—not merely a self-declared “natural” story.

The certification applies to the Litholife ingredient and its certified scope. It does not automatically make a finished pet food, treat or supplement eligible to display the USDA Organic seal. Finished-product composition, certified handling, processing, recordkeeping, labeling category and certifier approval must independently satisfy the applicable USDA rules. Certificate validity, scope and logo authorization should be confirmed before every commercial use.

6. Safety and healthfulness: a control system, not a slogan

A mineral ingredient is healthful only when identity, dose, contaminant control and finished-diet balance are all correct. Litholife’s specifications provide a strong starting platform.

Control area	Current documented program
Inorganic contaminants	325 mesh: As <1 ppm, Cd <1 ppm, Pb <1 ppm, Hg <0.01 ppm. 550 mesh: total As <3 ppm, inorganic As <1 ppm, Cd <1 ppm, Pb <1.5 ppm, Hg <0.01 ppm.

Control area	Current documented program
Microbiology	Specifications include total aerobic count, yeasts/molds, Enterobacteriaceae, E. coli, Salmonella (absent in 25 g), sulfite-reducing clostridia, coagulase-positive staphylococci, total coliforms, B. cereus and C. perfringens.
Allergens	Current specifications declare absence of major listed allergens, including fish, crustaceans and mollusks; buyer-specific verification and cross-contact review remain appropriate.
Composition	Identity plus calcium, magnesium, moisture, pH and other physicochemical parameters; natural variability disclosed.
Storage	Dry, ventilated storage protected from light and heat; 48-month shelf life; preferred use within 180 days after opening.
Documentation	Third-party accredited laboratory testing and lot CoA described in company materials; additional market-specific analyses can be agreed.

6.1 Critical formulation cautions

- Do not add Litholife to a complete-and-balanced diet merely for marketing. Recalculate the entire mineral system and confirm the finished diet against the current AAFCO profile or feeding-protocol strategy for the intended species and life stage.
- Control calcium-to-phosphorus ratio. Calcium supplied without corresponding phosphorus can unbalance meat-rich, homemade or complementary diets; conversely, excess calcium is a particular concern during growth, especially in large-breed puppies.
- Account for magnesium in feline formulations. “Urinary tract health,” “low magnesium,” urinary-pH and crystal-risk positioning requires specific formulation data and, depending on the claim, the type of substantiation described by FDA guidance. Litholife should not be marketed as a urinary-health ingredient without finished-diet studies.
- Use species- and life-stage-specific serving directions for supplements. A mineral supplement can be inappropriate when layered onto an already adequate complete food.
- Confirm finished-product homogeneity and analytical values. High-potency mineral ingredients can segregate in premixes or create large dose variation if blending and serving systems are poorly controlled.

7. U.S. regulatory pathway and claim discipline

Before interstate commercialization, the ingredient supplier and finished-product manufacturer should confirm a lawful ingredient pathway for the intended animal-food use. AAFCO definitions facilitate state acceptance, but AAFCO itself is not a regulator. FDA recognizes several routes for animal-food ingredients, and FDA’s current enforcement policy regarding AAFCO-defined ingredients should be reviewed with counsel. Human-food status, USDA Organic certification or use outside the United States does not automatically establish the ingredient’s legal status for U.S. dog or cat food.

Ingredient naming deserves early attention. Pet-food ingredient lists use established AAFCO names when a definition exists; an ingredient without an AAFCO definition must use an appropriate common or usual name and still have safety and utility established through a recognized route. “Litholife” may support marketing elsewhere on pack but should not replace the lawful ingredient declaration.

Recommended claim territory	Use with care / substantiate	Avoid without drug approval or specific regulatory pathway
"Source of calcium" or quantified calcium contribution; "contains naturally accompanying magnesium"; "marine-derived mineral ingredient"; documented process/certification facts.	"Highly bioavailable," "better absorbed," "supports strong bones," texture/stability effects, palatability, or "clean label"—each needs appropriate evidence and finished-product context.	Prevents osteoporosis, treats fractures, relieves arthritis, prevents urinary stones, reduces inflammation, cures mineral deficiency, or any express/ implied disease-treatment claim.

FDA states that express or implied claims to cure, treat, prevent or mitigate disease—or to affect body structure/function in a manner beyond food purposes such as nutritive value, aroma or taste—may establish intended use as a new animal drug. Marketing materials, websites, sales training and distributor statements can all contribute to intended use; claim discipline must therefore extend beyond the package.

8. Development workflow for a U.S. customer

1. 1. Define the product and regulatory route. Species, life stage, complete food versus supplement/treat, intended claims, states of sale and lawful ingredient name/pathway.
2. 2. Set the nutritional target. Establish desired calcium contribution and finished Ca, P, Mg and energy-basis targets using the current AAFCO Official Publication and a qualified animal nutritionist.
3. 3. Select the grade. Choose particle size from the unit operation: extrusion, retort, baking, soft-chew mixing, powder filling, encapsulation or compression.
4. 4. Calculate from the lot CoA. Correct inclusion for the assayed calcium value and account for magnesium and other relevant minerals.
5. 5. Run benchtop and pilot trials. Evaluate dispersion, segregation, dusting, dough/kibble behavior, sedimentation, color, flavor, texture, palatability and processing stability.
6. 6. Verify the finished product. Test nutrient composition, microbiology, contaminants as appropriate, content uniformity and stability across shelf life.
7. 7. Build the substantiation file. Retain specifications, CoAs, certificates, supplier qualification, hazard analysis, study reports, label review and claim evidence.
8. 8. Scale under change control. Define notification and requalification triggers for source, process, grade, specification, packaging or analytical-method changes.

9. Recommended commercial positioning

Positioning statement

Litholife is a marine-derived multimineral calcium ingredient from 100% Lithothamnion calcareum, developed for pet-food, treat and supplement formulators seeking concentrated calcium, naturally accompanying magnesium, flexible particle-size options and a robust lot-control program—supported by a distinctive clean-label and responsible-sourcing story.

The commercial message is strongest when the ingredient is sold as a formulation platform backed by documentation, not as a cure-all. Litholife can help brands create credible mineral-fortified products, but the finished product—not the raw material alone—must deliver nutritional adequacy, safety, palatability and compliant claims.

10. Evidence statement and research roadmap

Evidence hierarchy. Litholife-specific information in this article comes from current company technical specifications and commercial documentation. Peer-reviewed research on Lithothamnion or other marine-algae mineral preparations supports ingredient plausibility and animal-feed utility but cannot automatically be transferred to Litholife, dogs, cats, every particle size or every finished product.

A focused evidence program could materially strengthen future claims and industry adoption:

- analytical characterization across multiple Litholife lots, including calcium, magnesium, selected trace minerals, particle-size distribution and contaminant trends;
- standardized in-vitro digestion/solubilization comparison against an appropriate feed-grade calcium carbonate control;
- canine and/or feline tolerance and mineral-balance work at realistic inclusion levels under veterinary-nutrition oversight;
- finished-format palatability and processing trials in kibble, soft chews, powders and treats; and
- for any feline urinary-positioned product, finished-diet studies designed around FDA's current guidance rather than ingredient-level extrapolation.

References and source notes

1. **Litholife Seaweed Minerals Ltda.** ET01 – Calcium derived from Lithothamnion calcareum, 325 mesh. Revision April 24, 2025. Internal technical specification.
2. **Litholife Seaweed Minerals Ltda.** ET03 – Calcium derived from Lithothamnion calcareum, 550 mesh. Revision January 26, 2026. Internal technical specification.
3. **Litholife Seaweed Minerals Ltda.** Commercial Presentation – Litholife 2026. April 2026. Company source; marketing statements were used only where supported by specification or clearly qualified.
4. **dos Santos LBA et al.** Calcitic seaweed (Lithothamnion calcareum) as an organic source of calcium in piglet feeding. Animal Production Science. 2021;61:662–672. https://doi.org/10.1071/AN20008
5. **Zhu Y-S et al.** Solubilisation of calcium and magnesium from the marine red algae Lithothamnion calcareum. International Journal of Food Science & Technology. 2014;49:1603–1610.
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7. **Drysdale R et al.** Apparent digestibility and calcium and phosphorus in urine of dogs fed diets containing different calcium and phosphorus sources. PubMed PMID 39189324. 2024.
8. **Pinna C et al.** Seaweed supplementation failed to affect fecal microbiota and metabolome as well as selected immune and oxidative stress markers in dogs. Animals. 2021;11:2234. (Evidence concerns intact seaweeds, not Litholife specifically.)
9. **U.S. Food and Drug Administration, Center for Veterinary Medicine.** FDA's Regulation of Pet Food. Updated information accessed August 2026. https://www.fda.gov/animal-veterinary/animal-health-literacy/fdas-regulation-pet-food
10. **U.S. Food and Drug Administration, Center for Veterinary Medicine.** Animal Food Labeling and Pet Food Claims. https://www.fda.gov/animal-veterinary/animal-foods-feeds/animal-food-labeling-and-pet-food-claims
11. **U.S. Food and Drug Administration, Center for Veterinary Medicine.** Guidance for Industry #284: Using Relative Supersaturation to Support 'Urinary Tract Health' Claims for Adult Maintenance Cat Food. https://www.fda.gov/media/173985/download
12. **Association of American Feed Control Officials.** Reading Labels. https://www.aafco.org/consumers/understanding-pet-food/reading-labels/
13. **Association of American Feed Control Officials.** AAFCO Official Publication, current edition at time of formulation. Numeric nutrient limits should be verified against the licensed current edition before launch.

Important scientific and regulatory limitations

This document is a technical knowledge resource, not legal advice, veterinary advice or a finished-formula recommendation. U.S. ingredient status, state registration, label language, claim substantiation, certificate scope and the current AAFCO nutrient profiles must be confirmed for each intended use. Formulation should be performed or reviewed by a qualified companion-animal nutrition professional. Product-specific benefits require product-specific evidence.