

GROWLRR FOODS PVT LTD
· V300.1.0 -
DESIGNFREEZE · 19
MARCH 2026

Table with 5 columns: Dog Reliability (≥99.9997%), Cat Reliability (≥99.9997%), Grade A- or worse (0), Sul Breach (0), Median NRC Delivery (140%).

The Snowleopard Protocol™

Precision nutrition delivery, computationally validated

Dogs 2.5-40 kg · Cats 3-8 kg
· Adult maintenance · NRC 2006 · 110% buffer delivered

BILATERAL FEEDING CONTRACT

Growlrr guarantees ≥90% NRC 2006 RA on ≥99% of feeding days at 95% confidence. For healthy adult non-feral dogs 2.5-40 kg and cats 2.5-8.0 kg — across all bodyweight, activity, sterilisation, and BCS combinations — as long as the subscriber administers the protocol as specified.

C/R 95/99 · 90% NRC floor · All tracked nutrients & mineral ratios

Food Safety and Standards Act, 2006 · FSSAI regulations on contaminants, hygiene, FSMS & labelling - IS 11968 : 2019 (BIS) — nutrient profiles, contaminant limits, microbiological criteria · Adapted to supplement/topper use-case

R > 99.9997% · P < 3x10^-6

Growlrr Snowleopard Protocol™ — validated nutritional adequacy framework for dogs and cats, modelled after NRC 2006. Species-specific allometric energy modelling, body-weight, activity and BCS-scaled nutrient dosing, 3.4 million Monte Carlo simulation-assisted corrective iterations.

CatCore™ and DogCore™ — cold-compressed 4g precision nutrient blocks, validated across 1,000,000 cross-sectional nodes and 1,500 longitudinal feeding days. Zero grade A- or worse events. Zero toxicity ceiling breaches.

The system exhibits elastic buffering up to ~2x variance, followed by a yield-like transition where constraint interactions couple, and beyond which reliability degrades. We can say this because we ran it.

3.4 Million

Monte Carlo iterations

Corrective simulation cycles to converge the protocol formulation

1.0 Million

Cross-sectional nodes

Independent simulated feeding days across the full deployment envelope

22 Million

Nutrient delivery vectors

22 NRC nutrients x 1 Million nodes — every vector graded, every SUL ceiling checked

33 Million

Longitudinal data points

22 nutrients x 1,500 feeding days x 1,000 longitudinal animals tracked

TRIAXIAL STOCHASTIC NOISE MODEL

Three Independent Lognormal Variance Axes

Every simulated feeding day applies three independent lognormal perturbations simultaneously — centred on 1.0, no systematic bias. All three axes are statistically independent and applied concurrently.

20% BIO CV

Biological ingredient variance

Natural variation in nutrient concentration of biologically-derived ingredients — liver, egg, meat, fish — between batches, seasons, and animal sources. Not gut absorption variance. Decoupled nutrient variation inherent to whole-food biological raw materials.

10% GROCERY CV

Grocery measurement variance

Day-to-day variance in fresh food portions — the difference between a 290g mutton cut weighed by a market vendor versus the same cut weighed in a home kitchen. Includes seller trimming variation, scale precision, and portion estimation.

2% BLOCK CV

Block manufacturing variance

Tablet-to-tablet dose variance from cold-compression manufacturing. GMP tolerance. The tightest and most controllable axis — reflects Growlrr manufacturing precision.

Gut absorption variability deliberately excluded — species-constant, applies equally to all commercial pet foods, already embedded in the NRC Recommended Allowance safety factor.

READING THE PLOTS

Plot 1a is the system's core claim — the reliability curve. Everything else is evidence for it. Read it first. The knee at 2x

WHAT 2x ACTUALLY MEANS

Bio CV 40% · Grocery CV 20% · Block CV 4% — simultaneously. At that envelope the system still clears R≥98.8% dog, R≥99.5%

WHY THE 3D SURFACE MATTERS

Plot 3 (BW x M → z) shows that the safety floor holds uniformly across the full deployment envelope — no weak corner by

WHY NO ONE ELSE PUBLISHES THIS

Conventional pet nutrition formulations are deterministic — a fixed ingredient delivers a fixed nutrient at a fixed dose.

is the boundary between the world your animal lives in and a noise level that has no physiological analogue.

cat at 95% confidence. No SUL breach, no clinical ratio failure across 200,000 simulated feeding days.

body weight or activity level. The Lyapunov field has no sub-floor regions. One node at $z = -0.9$ across 100,000 simulations. Cat: zero.

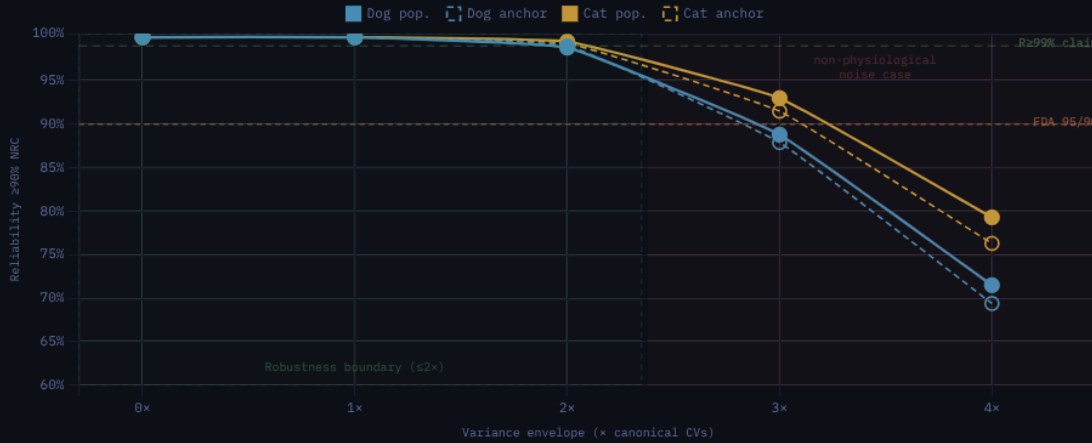
That assumption holds in a laboratory. It does not hold in a kitchen, a supply chain, or a biological system. We built our model for the world as it actually is.

PLOT 1A · PROTOCOL RELIABILITY UNDER VARIANCE AMPLIFICATION

Elastic Buffering · Yield Transition · Correlated Failure Regime

Reliability (% feeding days $\geq 90\%$ NRC floor) across four variance regimes. N=100,000 per point. Solid = full deployment population. Dashed = NRC anchor (Dog 20 kg M=1.5 · Cat 4 kg M=1.0). Anchor tracks population closely — knee is formulation-intrinsic, not allometric.

POPULATION + ANCHOR OVERLAY · 5 VARIANCE REGIMES



How to read: Each point = 100,000 simulated feeding days. **Solid lines** = full deployment population across all body weights and activity levels. **Dashed lines** = anchor animal (Dog 20 kg M=1.5 · Cat 4 kg M=1.0). The two shaded regions mark the FDA 95/90 threshold and the Growlrr R $\geq 99\%$ claim. The knee at ~2x is where constraint interactions begin coupling — everything to the left is the validated operating envelope. Anchor and population curves track closely, confirming the knee is formulation-intrinsic, not a population artefact.

Robust within physiological variance. Unstable only under correlated extremes.

LAYER 1 – STRUCTURAL SUFFICIENCY (0x)

Every nutrient meets or exceeds requirement before stochastic effects are introduced. Overdetermined at formulation level — not rescued by noise averaging.

LAYER 2 – DISTRIBUTED REDUNDANCY (1x–2x)

Multiple nutrients maintain headroom. Ratios hold. Physiological EMA buffers absorb uncorrelated noise. Reliability effectively invariant across the validated operating envelope.

LAYER 3 – CORRELATED FAILURE THRESHOLD (3x+)

Noise axes align negatively. Low-buffer nutrients drop first. SUL exceedances emerge alongside floor failures — coupled failure, not independent.

Dog – knee –2–3x

Broader allometric variance and multi-constraint proximity (B12, Cu, D3) create earlier coupling.

Cat – knee –3–4x

Single binding constraint (B2), tighter BW range. Simpler topology delays coupling.

Designing for 4x resilience would require chronic over-supplementation introducing SUL risk — a worse system. The critical threshold is the correct design point.

0x Deterministic

Dog 147.7% · Cat 142.1% NRC. R=100%. Single binding constraint per species — B12 dog, B2 cat.

1x–2x Operating envelope

R $\geq 99.9997\%$ at 1x (Rule of Three, C95). Dog R $\geq 98.8\%$, Cat R $\geq 99.5\%$ at 2x. Both above FDA 95/90 and Growlrr C/R 95/99 claim. No SUL breach.

3x–4x Non-physiological

SUL exceedances emerge at 4x alongside floor failures — simultaneous multi-axis divergence. No physiological analogue in real feeding.

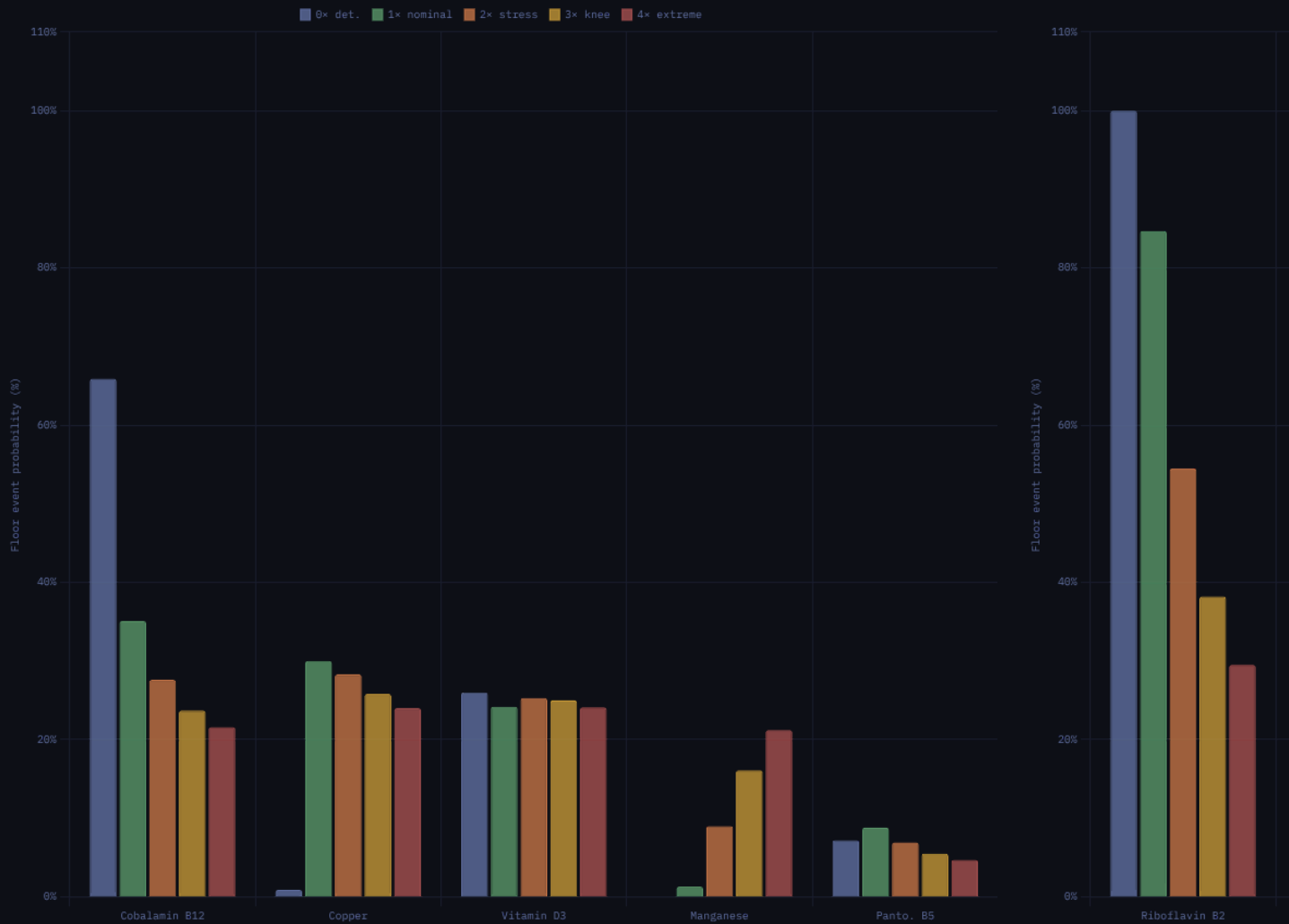
PLOT 1B · FLOOR NUTRIENT FRAGMENTATION UNDER VARIANCE AMPLIFICATION

How Floor Probability Distributes Across Nutrients as Noise Increases

Being the "floor nutrient" means lowest-ranked NRC delivery on that day — not a deficit. At 0x, one nutrient owns 100% of floor events. Under noise, risk fragments. A robust multi-source system shows no single point of failure

DOG – TOP 5 FLOOR NUTRIENTS

CAT – TOP 5 FLOOR NUTRIENTS



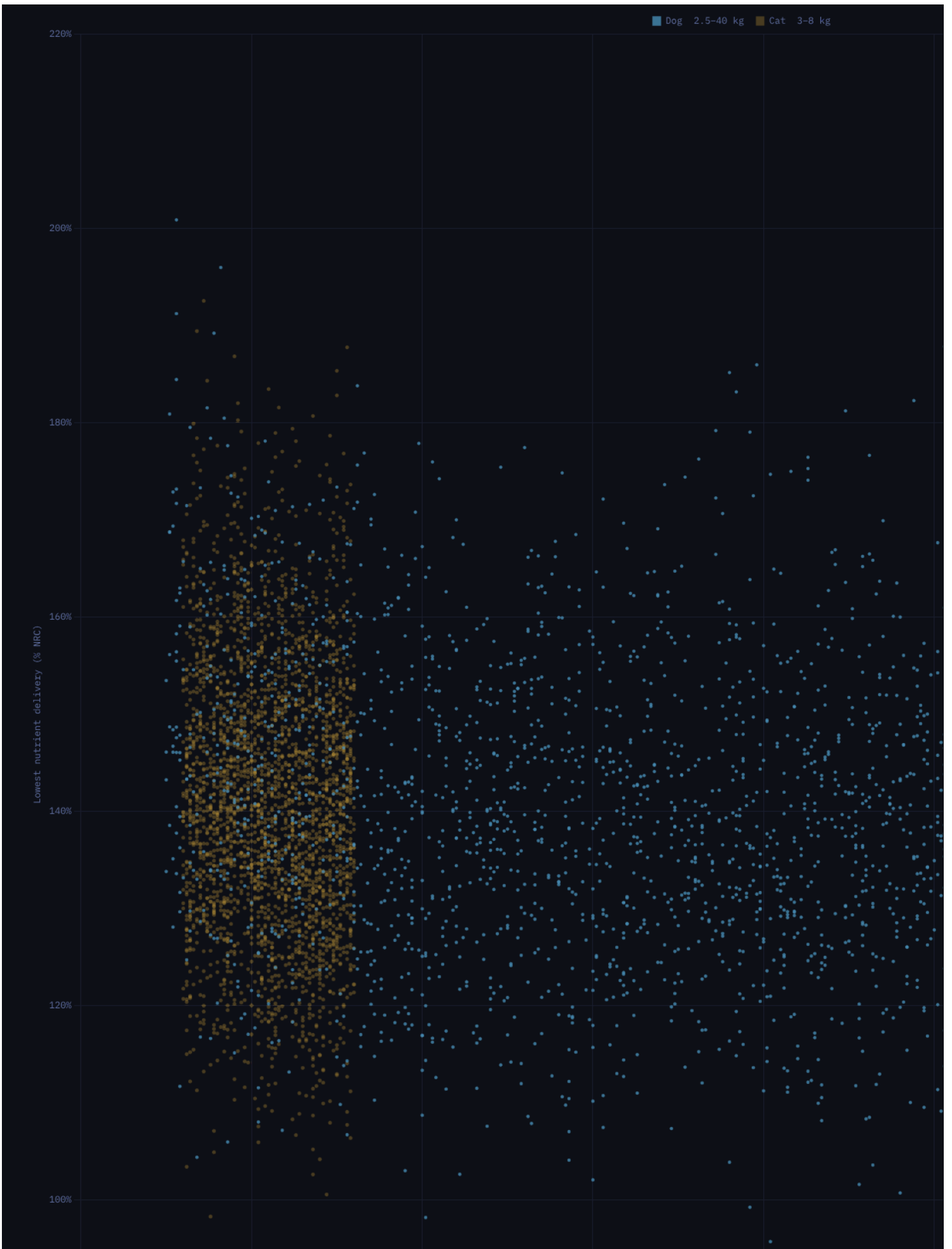
Dog: Each bar group = one variance regime (0x through 4x). Coloured segments show which nutrients are most often the floor limiter – lowest-ranked delivery on any given day. A single dominant nutrient at 0x (B12) that spreads across five nutrients at 4x is the signature of a robust multi-source formulation – no single point of failure.

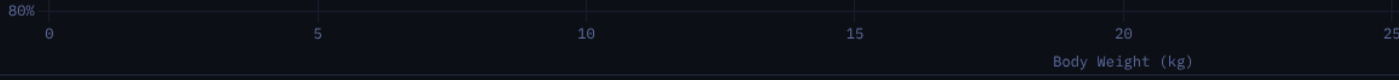
Cat: B2 Riboflavin dominates at all variance regimes (100% at 0x, 85% at 1x, 55% at 2x, 38% at 3x, 30% at 4x), indicating a highly concentrated and consistent nutrient source across all deployment conditions.

PLOT 2A - 100,000 REPRESENTATIVE NODES - REAL SIMULATION DATA

Body Weight vs Nutrient Delivery Floor – Full Deployment Envelope

Every point is one simulated animal under all three stochastic axes. Population baseline stays above 90% NRC across all body weights. Uniform density across the full dog size range (2.5–40 kg) and cat range (3–8 kg).



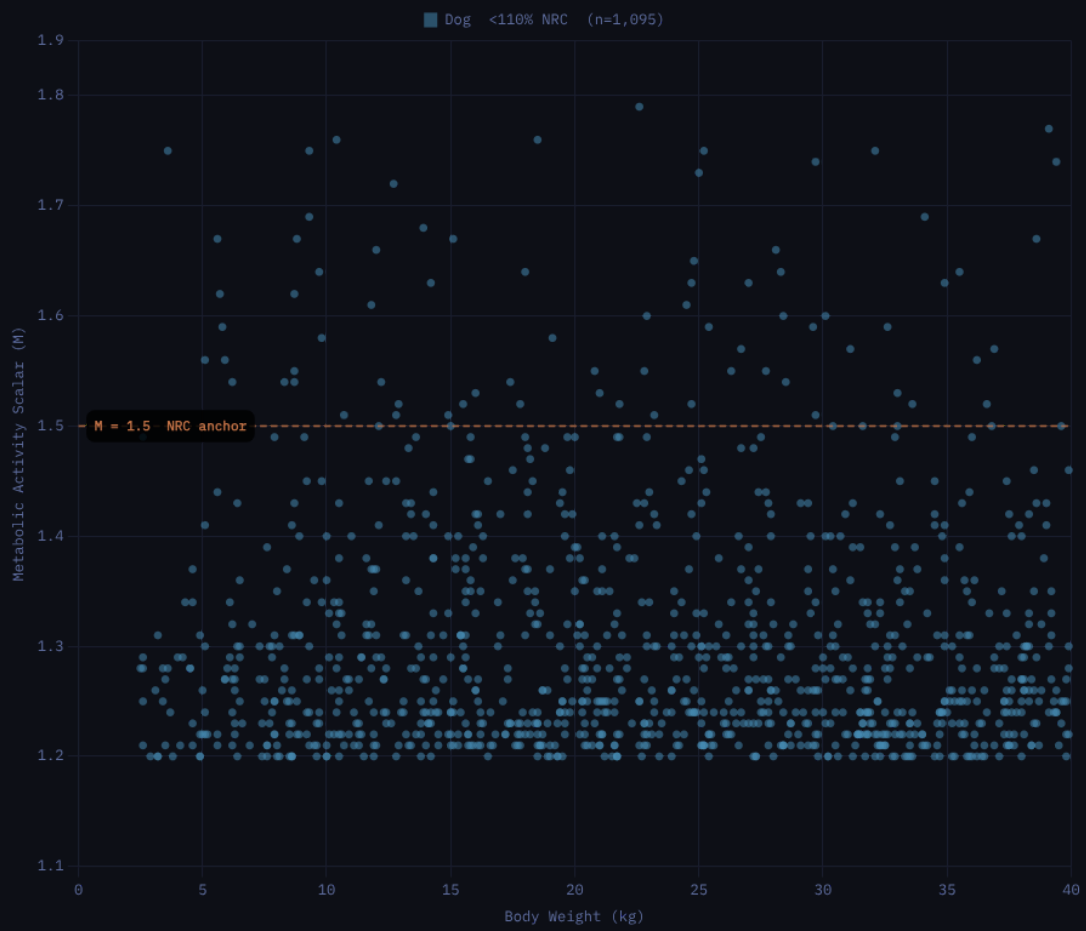


How to read: Each dot = one simulated animal under all three noise axes simultaneously. Y-axis = the single worst-ranked nutrient delivery across all 22 NRC nutrients tracked – not exceptions. Cat cluster is visible bottom-left (lower BW, lower absolute delivery range).

PLOT 2B · DOG · 1,095 NODES WITH DELIVERY <110% NRC

Dog Tight-Margin Envelope — Body Weight × Activity

The NRC Beagle Bias. 92.5% of tight-margin nodes cluster below the $M=1.5$ activity anchor (dashed line). NRC 2006 allometric equations were calibrated on the laboratory beagle – a diet-restricted, low-activity animal. When the Snow leopard Protocol models a sedentary dog at $M<1.5$, grocery nutrients are proportionally throttled alongside energy, creating the tightest delivery margins.

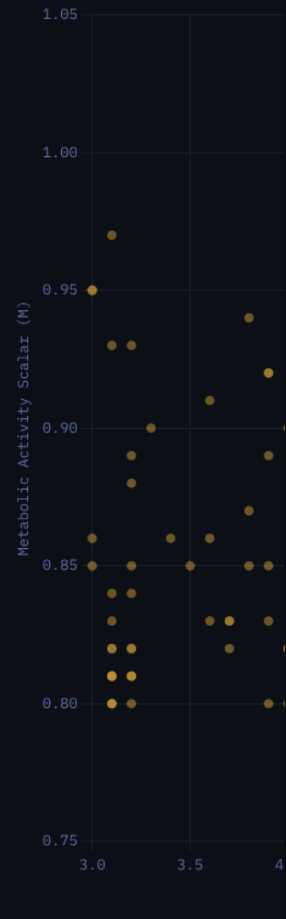


How to read: Filtered to the 1,095 tightest-margin dog nodes (out of 700,000). X = body weight, Y = metabolic activity scalar M. Clustering below the $M=1.5$ anchor line reflects the NRC Beagle Bias – NRC equations were calibrated on sedentary laboratory beagles. A sedentary dog at $M<1.5$ receives proportionally throttled grocery nutrients alongside energy, creating the tightest delivery margins in the system.

PLOT 2C · CAT · 225 NODES WITH TIGHTEST MARGINS

Cat Tight-Margin Envelope —

225 cat nodes with the tightest delivery margin



How to read: 225 tightest-margin cat nodes. The bottom-left corner in the feline envelope represents the weakest corner.

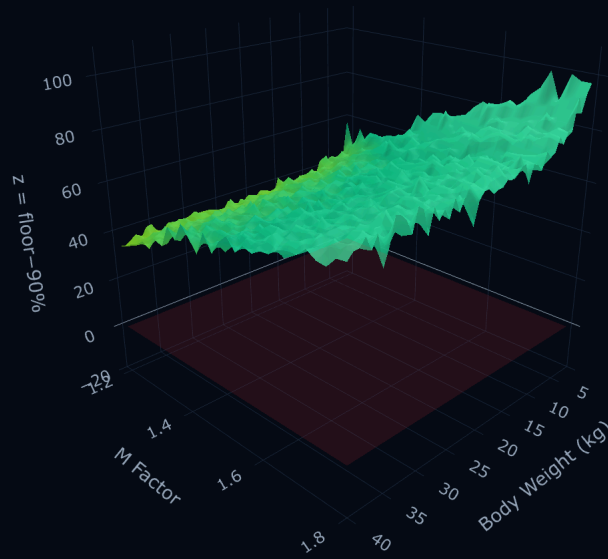
PLOT 3C · GRADE DISTRIBUTION · 100K NODES



Plot 4 · BW × M → z = Distance from 90% NRC Floor

$z = \text{lowestPct} - 90$ · $z>0$ safe above floor · $z=0$ clinical boundary · $z<0$ below floor (dog min = -0.9, cat min = +11.5 – none clinical failures)

K-SEPTA-3D · V300.1.0-DESIGNFREEZE · REAL MC DATA — 100K NODES



■ z>40 Deeply safe ■ z 10-40 Adequate ■ z 0-10 Tight ■ z<0 Below floor (none)

Real K-Septa-Optimus data · 100k nodes · Block CV=2% · Bio CV=20% · Grocery CV=10%

TYPICAL · MEAN

Computation: Mean of lowestPct – the worst single nutrient’s delivery – across all simulation nodes in each BW×M bin. Every node is already a worst-case selection across 22 nutrients; this is the central tendency of that floor.

Meaning: Where the system naturally operates under representative noise. The attractor surface. What most animals see on most days.

CONSERVATIVE · P5

Computation: 5th percentile of the floor distribution per bin – estimated as mean – 1.645σ (one-tailed normal approximation). Only 5% of simulated days fall below this surface.

Meaning: A regulatory claim in plain language: on 95% of days, every animal in this BW×M zone exceeds this margin. The surface to cite in a safety dossier.

LYAPUNOV FIELD · MIN

Computation: Worst single node in each bin across 100,000 simulated feedings – simultaneous worst-case draw on all three noise axes. A stress test, not a realistic scenario. Real life almost never compounds all noise axes at once.

Meaning: A static landscape proof – the potential well has no sub-floor regions and no escape routes below the compliance boundary (z = 0). The dog’s single worst node: BW 21.4 kg, M 1.20, limiting nutrient Pantothenic B5, delivered 89.1% NRC – z = -0.92, Grade A, SUL score 1. One node across 100,000. Cat min z = +9.0 (no failures anywhere).

STACK MODE

What it shows: All three surfaces rendered simultaneously in the same 3D volume as geological layers – Typical (top), P5 (middle), Lyapunov (bottom, closest to z=0 boundary).

Why it matters: The vertical gap between Typical and Lyapunov at each BW×M point is the stochastic noise envelope width. Wide gap = high variance at that location. Narrow gap = tight, predictable delivery. The M=1.2 low-BW edge shows the widest gap – the protocol’s most variable zone.

PLOT 4 · EMA TELEMETRY · LONGITUDINAL SIMULATION · DOG 20-25 KG + CAT 4-5 KG · 1,500 FEEDING DAYS

Biological Reserve Momentum – Attractor & Ripple

The horizontal line is the long-run delivery target. Dots are actual simulated reserve levels sampled every five days. Ripple width is physiological buffering depth: narrow for fat-soluble vitamins and minerals, wide for water-solub

🐕 DOG · 20-25 KG · ACTIVITY 1.15-1.60

COPPER

floor margin +51.2% · σ = 4.75%

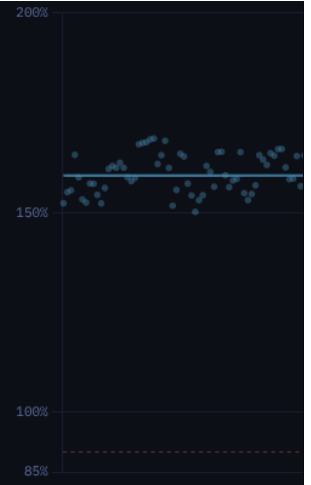
14d | α = 0.133

VITAMIN D3

floor margin +59.5% · σ = 4.12%



🐱 CAT · 4-5 KG · ACTIVITY 0.80-1.00



RIBOFLAVIN B2

floor margin +33.6% · $\sigma = 10.42\%$

3d | $\alpha = 0.500$



VITAMIN D3

floor margin +177.4% · $\sigma = 8.18\%$



How to read: Each tile = one nutrient tracked across 1,500 longitudinal feeding days. The **horizontal line** = long-run attractor (converged reserve target - where the physiological reserve is maintained). The **spread of points** = physiological buffering depth: narrow for fat-soluble vitamins and minerals (deep reserves, slow turnover - reserve barely moves day to day); wide for water-soluble B vitamins (fast turnover - reserve moves across all 1,500 days).

PLOT 5A · LONG-RUN MEAN DELIVERY · DOG 20-25 KG · SORTED HIGH - LOW · P5-P95 CONFIDENCE BAND

Dog - Full NRC Portfolio Delivery

PLOT 5B · LONG-RUN MEAN DELIVERY · CAT 4-5 KG · SORTED HIGH - LOW · P5-P95 CONFIDENCE BAND

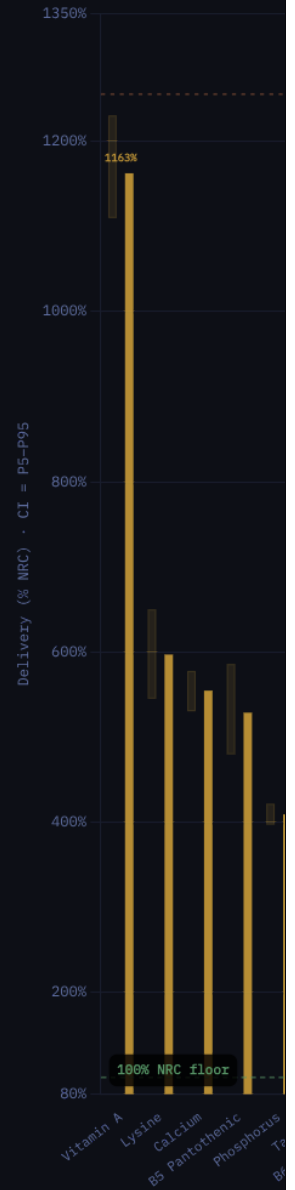
Cat - Full NRC Portfolio Delivery



How to read: Bars sorted high to low by mean delivery. The shaded band behind each bar = P5-P95 interval across 1,266 longitudinal simulation days – day-to-day variance, not cross-sectional spread. A wide band means high daily volatility for that nutrient (typically water-soluble B vitamins). The horizontal lines mark 100% NRC floor (green) and the SUL ceiling (orange). Vitamin A is display-capped – actual mean value annotated above the bar. Taurine is multi-sourced (block + red meat + sardine) – the narrow CI reflects the redundancy.

PLOT 5C · CLINICAL RATIOS · DOG · ALL IN TARGET RANGE

Dog – Ca:P · Zn:Cu · Mg:Zn · Cu:Mn · ω6:ω3 · VitE/PUFA



How to read: Same layout as Plot 5C. This chart shows less day-to-day variance at the top and narrower allometric range.

PLOT 5D · CLINICAL RATIOS · CAT · ALL IN TARGET RANGE

Cat – Ca:P · Zn:Cu · Mg:Zn · Cu:Mn · ω6:ω3 · VitE/PUFA



How to read: Each floating stub is centred on the delivered ratio value. The **I-beam** shows the clinical target range (lo-hi). A stub within the I-beam is in range (dog blue). Value annotated above each stub. All six ratios in range: Ca:P (structural integrity), Zn:Cu (immune function), Mg:Zn (enzymatic), Cu:Mn (antioxidant), ω6:ω3 (inflammatory balance), VitE/PUFA (lipid oxidation protection).

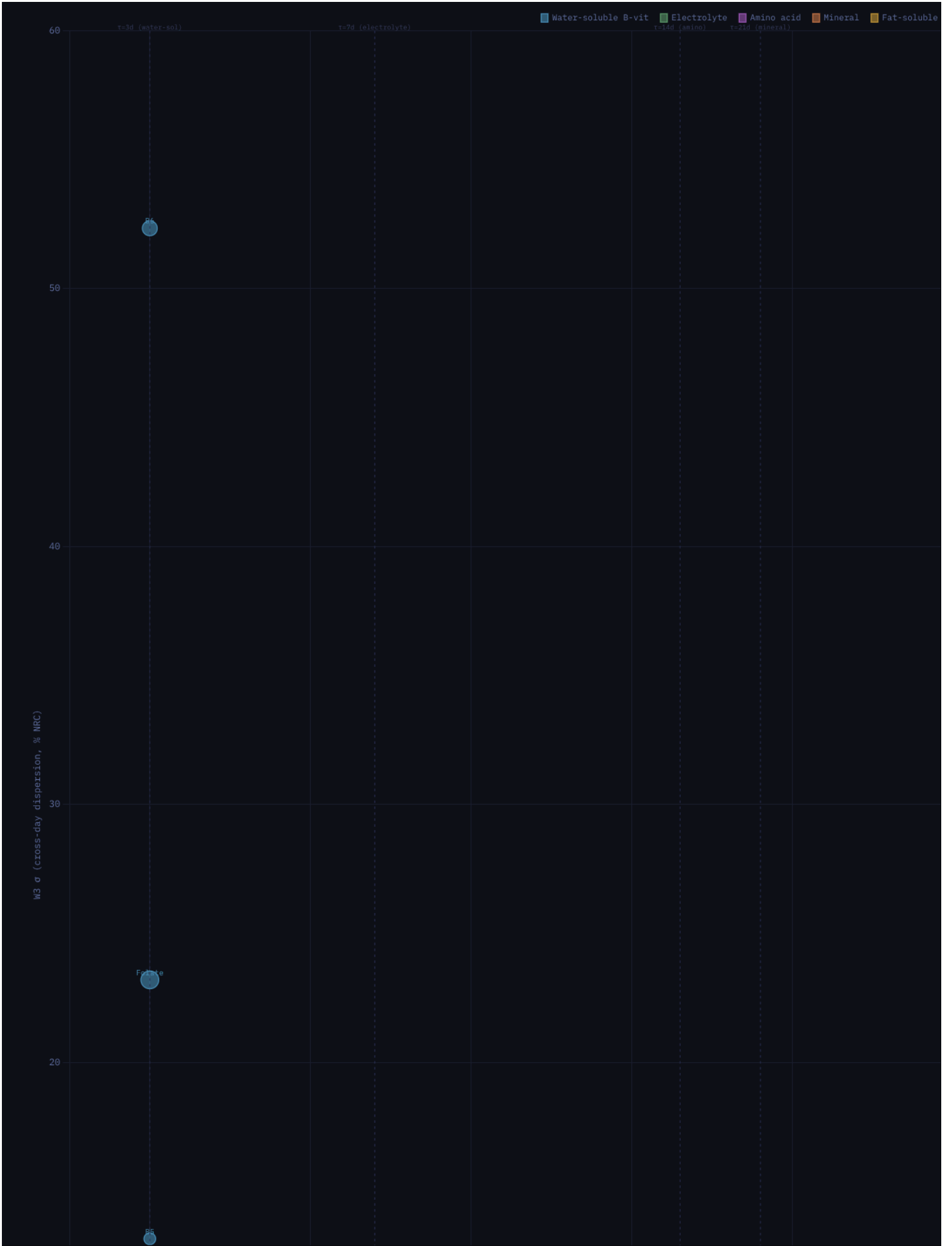
How to read: Same layout as Plot 5. The dog equivalent – cats have high...

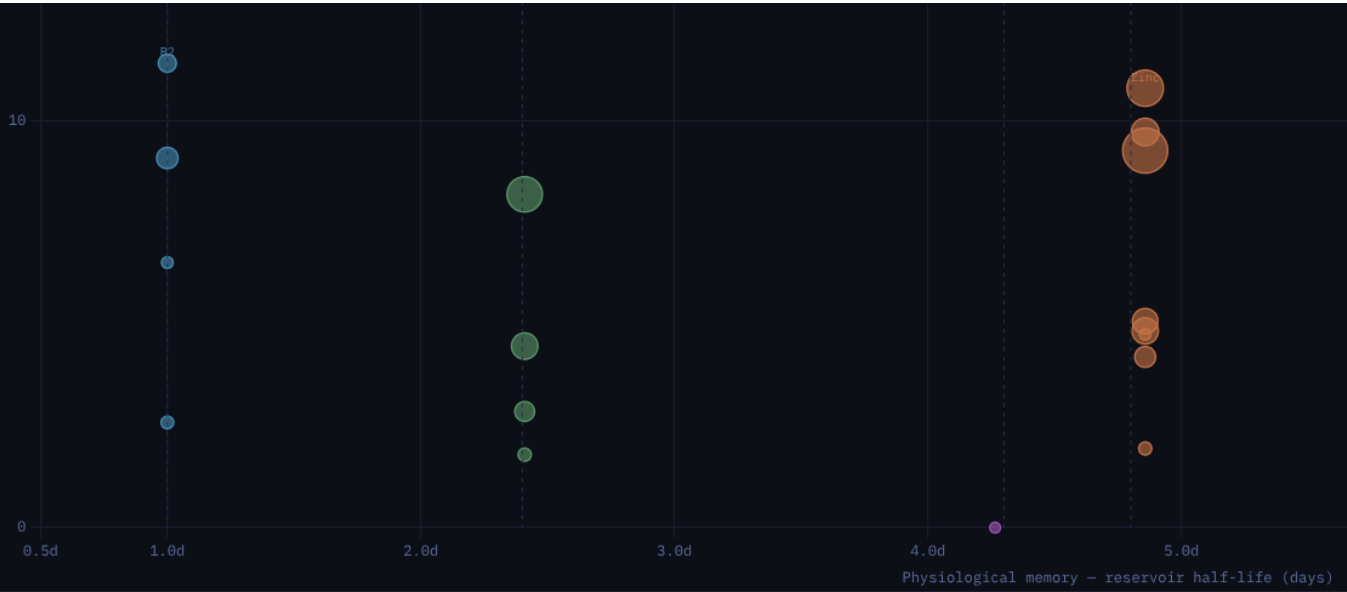
PLOT 6A - SERIAL MEMORY P VS CROSS-DAY DISPERSION Σ - DOG - 20-25 KG ANCHOR

Nutrient Dosing Sensitivity Landscape

X = ρ (lag-1 autocorrelation – how slowly the reserve forgets), Y = $W3\sigma$ (cross-day dispersion at convergence). Bubble size = |drift|. Bottom-left = stable backbone. Top-right = dosing sensitivity hotspot. Bottom-right = fast-washout floor limiter zone.

DOG - 20-25 KG ANCHOR





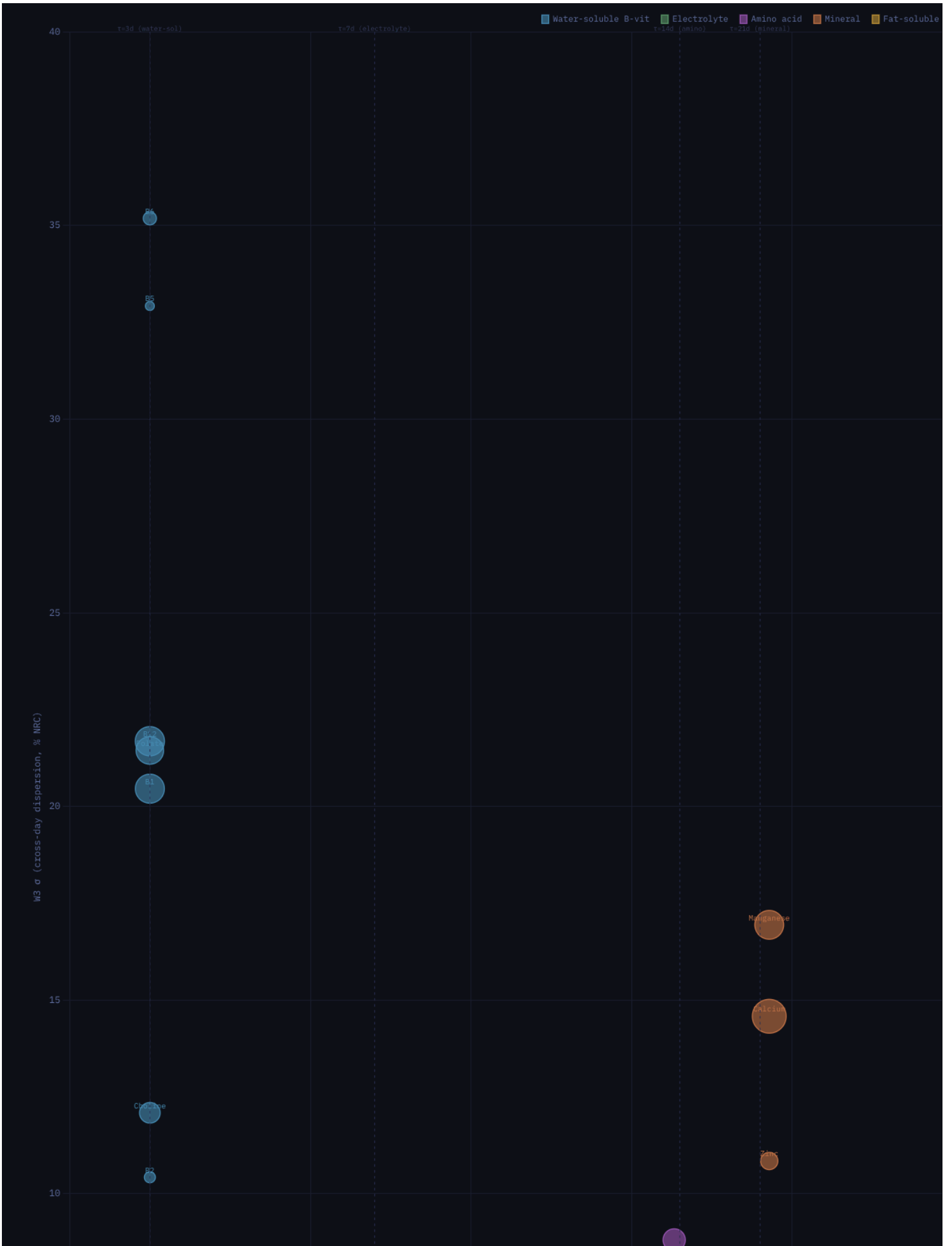
How to read: $X = \rho$ (EMA lag-1 autocorrelation). High $\rho \rightarrow$ fat-soluble, slow-turnover. Low $\rho \rightarrow$ water-soluble, fast-cycling. $Y = M3 \sigma$ (cross-day dispersion). Bubble size = |drift|. **Bottom-left** = stable backbone nutrients. **Top-right** = dosing sensitivity hotspot (Vit A). **Bottom-right** = fast washout + floor limiter zone (B12, B2).

PLOT 6B · SERIAL MEMORY ρ VS CROSS-DAY DISPERSION σ · CAT · 4-5 KG ANCHOR

Nutrient Dosing Sensitivity Landscape

Same axes as Plot 6a. Cat topology: B2 Riboflavin as the primary low- ρ floor limiter. Cat Vit A at high ρ and wide σ – fat-soluble, slow-turnover, high-reserve nutrient with the widest absolute range.

CAT · 4-5 KG ANCHOR





Cat vs Dog: Cat topology is simpler – B2 Riboflavin anchors the floor-limiter zone (low ρ , moderate σ). Vit A sits far right with high serial memory and wide range. The cat cluster is tighter overall, reflecting the narrower allometric envelope (3-8 kg vs 2.5-40 kg for dog) and single binding-constraint topology.

APPENDIX – SUPPORTING DETAIL

APPENDIX · MODEL VOCABULARY · SNOWLEOPARD PROTOCOL™

How the System Describes Itself

Reference definitions for all terms used across the validation dashboard. Attractor and stability mechanics · Yield transition and failure regimes · Portfolio and dosing analytics · Statistical scaffolding.

<p>Central Attractor</p> <p>The long-run mean reserve level to which the EMA system converges after full physiological equilibration (~300 days). The horizontal line in each EMA tile. The system is designed to maintain this above 110% NRC.</p>	<p>Elastic Buffering</p> <p>The variance regime ($\leq 2\times$ canonical CV) where the system absorbs stochastic noise without meaningful reliability degradation. The flat plateau of the reliability curve. Physiological EMA reserves act as the buffer.</p>	<p>Yield Transition</p> <p>The ~2-3\times (dog) and ~3-4\times (cat) variance zone where constraint interactions begin coupling – analogous to the yield point in stress-strain analysis. Below yield: elastic recovery. Above yield: permanent deformation.</p>
<p>Correlated Failure</p> <p>The 3+ regime where multiple noise axes align negatively simultaneously. SUL exceedances and floor failures emerge together – the signature of coupled failure, not independent random events.</p>	<p>Lyapunov Field</p> <p>The worst-case single-node surface across all BW\timesM combinations. Confirms the potential well has no sub-floor escape routes. Dog global minimum: $z = -0.9$ (one node, 100k simulations), Cat: zero failures.</p>	<p>Mesa</p> <p>The flat plateau of the Typical (mean) delivery surface across the BW\timesM allometric envelope. A wide, uniform mesa indicates structural robustness – no weak corners by body weight or activity level.</p>
<p>Serial Memory · ρ</p> <p>EMA lag-1 autocorrelation – how slowly the physiological reserve forgets yesterday's delivery. High ρ – fat-soluble, slow-turnover (deep reserves). Low ρ – water-soluble, fast-cycling (reactive to each meal).</p>	<p>W3 Dispersion · σ</p> <p>Cross-day standard deviation of reserve levels in the converged window (days 1,100-1,266). High σ = high day-to-day volatility. Paired with ρ to classify each nutrient's dosing sensitivity.</p>	<p>Portfolio Volatility</p> <p>Per-nutrient delivery CV in the converged EMA window. The x-axis of the nutritional risk-return landscape. Low volatility + high mean = the ideal portfolio position. Minerals and fat-soluble vitamins cluster here.</p>
<p>Floor Nutrient</p> <p>The lowest-ranked NRC delivery on any given simulated day – the binding constraint for that node. Not a deficit: every floor event is still grade A or better. Fragmentation of floor events = system robustness.</p>	<p>Rule of Three</p> <p>Zero-failure upper-bound method. Zero failures in N trials – $R \geq 1 - 3/N$ at 95% confidence. Zero failures in 1,000,000 nodes at 1\times CV – $R \geq 99.9997\%$ C95. No assumptions about failure distribution required.</p>	<p>Tau Class · α</p> <p>Physiological turnover classification: water-sol $\tau = 3d$ ($\alpha = 0.500$), amino $\tau = 4d$ ($\alpha = 0.400$), mineral $\tau = 7d$ ($\alpha = 0.250$), fat-sol $\tau = 10d$ ($\alpha = 0.182$). Determines EMA weighting and serial memory $\rho = 1 - \alpha$ per class.</p>
<p>C/R 95/99</p> <p>Confidence/Reliability: $R \geq 99\%$ of feeding days meet the 90% NRC floor, at C=95% statistical confidence. The bilateral guarantee threshold. Growlrr's observed performance at 1\times CV exceeds this by ~2,997\times ($R \geq 99.9997\%$).</p>	<p>Robustness Boundary</p> <p>The 2\times canonical CV threshold marking the edge of the elastic buffering zone. Bio CV 40% + Grocery CV 20% + Block CV 4%, simultaneously. Beyond this boundary: the yield transition begins.</p>	