HEXIS Performance Nutrition · Research Insight 2026

The Simplest Nutrition Upgrade That *Will* Make You Faster.

It's not a secret supplement. It's not how many grams per hour of carb they can eat on the bike. It might just be what they eat on a Tuesday.

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Dataset: Hexis internal · n = 3,636 days · 52 professional cyclists

What if the single biggest nutritional difference between a professional cyclist and the rest of us wasn't how many grams of carbohydrate they take on per hour during a race? What if it was something far simpler, and far more actionable, than that?

What if the pros just do a much better job of eating more on the days they train hard, and less on the days they don't!?

It sounds almost too obvious to be interesting. But the data behind this idea is striking, and it points to something that most recreational riders are quietly getting wrong, week after week, without ever realising it.

The Research That Got Us Thinking

Earlier this year, sports scientist Jeff Rothschild and colleagues at Auckland University of Technology published a landmark observational study in the *International Journal of Sport Nutrition and Exercise Metabolism*. Over 12 weeks, 46 endurance athletes — triathletes, runners, and cyclists — logged every meal and every training session using smartphone apps. That produced 3,718 days of dietary data to work with, which is a far richer picture of real-world eating behaviour than any short-term lab study could provide.

The central question was deceptively simple: when an athlete trains harder, do they eat more carbohydrate? And when training is lighter, do they pull back?

At the group level, the answer was a tentative yes. Carbohydrate intake did tend to rise on heavier training days, driven mainly by session duration, the longer the ride, the more the athletes ate. On the face of it, the "fuel for the work required" principle seemed to be playing out in practice.

But Rothschild didn't stop at the group average, and that's where things got really interesting.

When he looked at each individual athlete separately, the picture changed dramatically. Participant-level correlations between daily training load and carbohydrate intake ranged from −0.42 to 0.83. In plain terms: some athletes showed a strong, logical relationship between how hard they trained and how much they ate, but a large number showed almost none at all. Only 26% of athletes demonstrated what the researchers classified as a moderate or stronger individual correlation, i.e. they ate more when training was long/hard. The remaining 74% did not align their nutrition as well with their training.

The "group average" was, in statistical terms, a bit of an illusion, a phenomenon researchers call *nonergodicity*: the group pattern doesn't reliably describe any individual within it. Most of these recreational endurance athletes were eating in a way that was fairly consistent from day to day, regardless of whether Monday was a three-hour long ride or a rest day. The variation in carbohydrate intake was there, but for many athletes it was small, a nudge rather than a genuine adjustment.

Average daily carbohydrate intake across the group sat at 3.9 g/kg, well below the 5–10 g/kg recommended for athletes training one to three hours a day.

What the Professionals Do Differently

That paper sent us back to our own data. At Hexis, we've spent several years helping pro teams fuel their riders and have accumulated the largest datasets of professional athlete nutrition and training in existence, tens of thousands of days of logged food and training across hundreds of elite athletes (~50,000 days to be precise). We pulled a comparable subset: 52 professional cyclists, representing 3,636 days of training and racing data.

We ran the same analysis.

The contrast was immediate and, frankly, striking.

The correlation between daily training energy demands and carbohydrate intake in the professional group came out at $r = 0.81$, a strong positive relationship by any conventional standard. When we ran the same individual-level nonergodicity tests that Rothschild applied to his recreational cohort, we found no significant evidence of it. The group correlation was a genuine representation of individual behaviour. The pros weren't just averaging out to look like they were periodising their nutrition, they actually were!

And the magnitude of the swing was substantial. On rest days or light recovery days, carbohydrate intake dropped considerably. On hard training days or race stages, it climbed to match demand. Average intake in the professional group sat between 10 and 12 g/kg, roughly double what Rothschild observed in recreational athletes. Some of that difference is simply because professional cyclists do an enormous amount of work. But the more meaningful finding is the *shape* of the intake pattern: the pros are creating large, deliberate fluctuations day to day, consistently, across the whole group.

This isn't just about race days either. The same pattern held across training blocks. When the work went up, the food went up. When the work came down, so did the carbohydrate. That rhythmic matching of energy-in to energy-out, day by day, session by session, appears to be one of the most consistent features of how elite cyclists fuel their training.

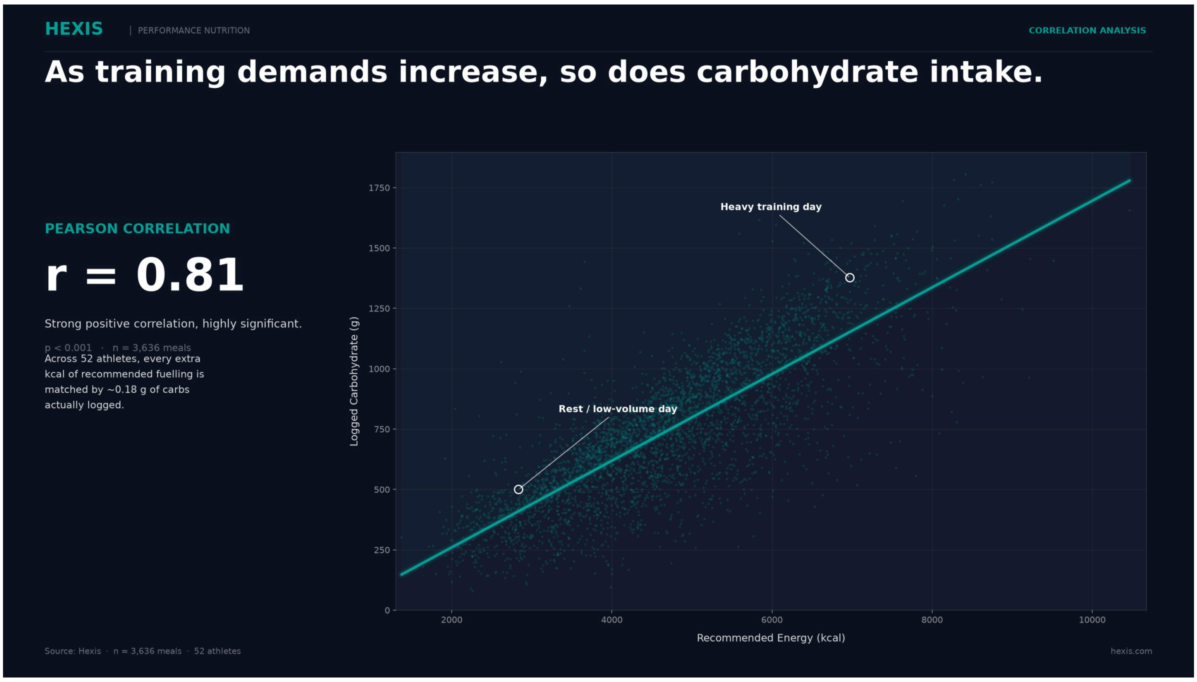

Figure 1. Correlation between daily recommended energy expenditure (kcal) and logged carbohydrate intake (g) across 52 professional cyclists (n = 3,636 meals). Pearson r = 0.81, p < 0.001. Every additional kcal of recommended fuelling is matched by ~0.18 g of carbohydrate actually logged. Source: Hexis internal dataset.

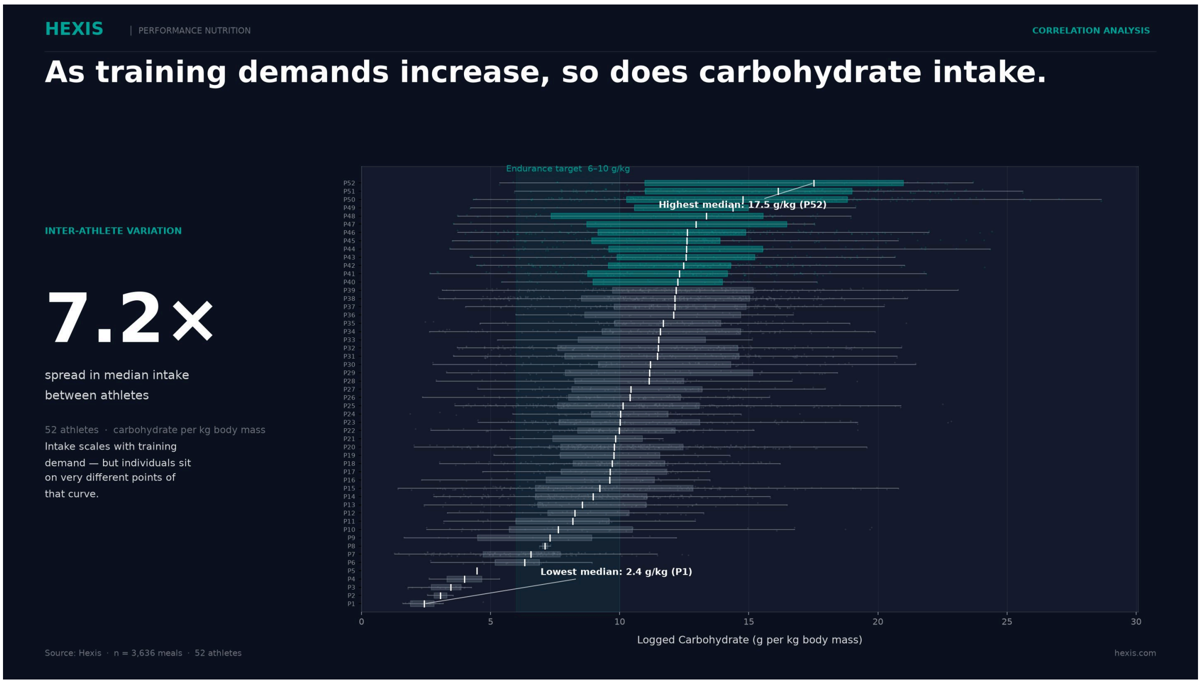

Figure 2. Inter-athlete variation in logged carbohydrate intake (g per kg body mass) across 52 professional cyclists, ranked by median intake. The 7.2× spread between the lowest (P1: 2.4 g/kg) and highest (P52: 17.5 g/kg) median intakes illustrates that while training demand drives the group-level signal, individuals sit on very different points of that curve. Teal bars indicate athletes meeting the endurance target of 6–10 g/kg. Source: Hexis internal dataset.

Why It Matters More Than You Might Think

The "fuel for the work required" framework has been a cornerstone of sports nutrition thinking for over a decade. The underlying logic is sound: carbohydrate availability during and around training influences cellular signalling, adaptation responses, glycogen synthesis, and the capacity to sustain back-to-back days of hard work. Getting this right is part of how you build the metabolic machinery that makes elite performance possible.

What this data suggests is that professional cyclists aren't just aware of this in principle, they're living it in practice, with a consistency and precision that most recreational athletes don't come close to matching.

For the recreational rider, the barrier isn't usually understanding. Ask most committed cyclists whether you should eat more on a big training day and they'll tell you yes without hesitation. The gap is in execution. We're creatures of habit. Most of us eat the same two or three things for breakfast, cycle through the same lunches and dinners, and make modest adjustments at the margins depending on how hungry we feel. The result is a diet that's reasonably consistent across the week, which could keep your body weight stable, but, is exactly the wrong shape if you're trying to match your fuelling to the actual demands of your training to enhance your performance.

What You Can Actually Do About It

The good news is that acting on this doesn't require a professional support team. Technology that integrates your training, lifestyle and goals is here to help, and this is where Hexis comes in.

- **Anchor your carbohydrate intake to your training schedule.** Before the week starts, sync your training and look at what you have planned. Your hard days, long rides, intensity work, back-to-back sessions will be your highest carbohydrate days. Your easy days and rest days should be noticeably lower. This isn't about going hungry; total energy and protein can stay more consistent. It's about the carbohydrate specifically that needs to move with the workload.
- **Think in terms of the whole day, not just the ride.** The research shows that recreational athletes do adjust somewhat around the session itself more carbohydrate before and during harder efforts but then miss the opportunity to optimise the total daily intake. The pros aren't just fuelling during the ride; they're building high-carbohydrate around their hardest training.
- **Make the swing meaningful.** Hexis' carb coding system will structure your carb intake around your training to deliver the optimal fueling before, during and after each training session. If you look at the professional data, the difference between a hard day and a rest day is substantial, not incremental. You don't need to hit professional volumes, but the principle scales: the contrast between your high days and your low days should be real enough to matter physiologically.
- **Recovery is part of fuelling for the work required.** Rothschild's paper notes that restoring muscle glycogen fully after exhaustive training requires higher carbohydrate intake than most athletes achieve. On your hardest training days, the work doesn't end when you get off the bike. The hours afterwards are where much of the adaptation is shaped, and carbohydrate availability in that window matters! So, fuel those adaptations that you have just put into action with training. And do it with carbs!

Closing The Nutrition Gap

The gap between recreational and professional nutrition isn't really about access to exotic products or closely guarded secrets. It looks increasingly like it comes down to the disciplined, consistent application of a principle most of us already know: fuel for the work you're actually doing. More on the days it's hard. Less on the days it isn't.

Simple, in theory. Harder to execute than it sounds. But if the data is telling us anything, it's that getting this right might be one of the most powerful levers available to the everyday cyclist who wants to get more out of their training.

Endnotes: Data from Hexis's professional athlete dataset (N=52 athletes, 3,636 days) was used in the analysis described above. The Rothschild et al. study referenced throughout is: "Dietary Intake of Endurance Athletes During 12 Weeks of Self-Selected Training: An Observational Study," *International Journal of Sport Nutrition and Exercise Metabolism*, 2026.

Statistical Appendix — Hexis Professional Athlete Dataset (for academic reference)

Dataset: The final analysed dataset comprised 3,636 observations across 52 unique users. This two-stage filter materially improved data quality: the v1 filter (zero carbohydrate exclusion only, n = 4,735 rows) produced a Pearson r of 0.606 ($r^2 = 0.367$), while the v2 filter (adding the ≥50% meals logged criterion) increased this to r = 0.809 ($r^2 = 0.654$), an improvement of $\Delta r^2 = 0.287$. This confirms that partial meal logging days were the primary source of noise in the dataset rather than genuine behavioural variability.

Descriptive statistics: Mean logged carbohydrate intake: 748.7 g/day (SD = 298.3, median = 728 g, skewness = 0.34, excess kurtosis = −0.28). Mean recommended energy expenditure: 4,722.4 kcal/day (SD = 1,345.2, median = 4,663.5 kcal, skewness = 0.26, excess kurtosis = −0.25). Both distributions are approximately normal (skewness < 0.35, near-zero excess kurtosis), supporting the use of Pearson correlation.

Correlation analysis: Pearson r (selected): 0.809 (strong positive). Spearman rank correlation: 0.808. The close agreement between Pearson and Spearman coefficients confirms the relationship is not driven by outliers or distributional artefacts.

Nonergodicity testing — three tests applied

Test 1 — Intraclass Correlation Coefficient (ICC) / Variance Decomposition: Logged carbohydrate ICC = 0.212 (between-person variance = 21.2%, within-person variance = 78.8%; MS Between = 1,382,563, MS Within = 70,599). Recommended energy ICC = 0.253 (between-person = 25.3%, within-person = 74.7%; MS Between = 33,175,102, MS Within = 1,363,205). ICC values below 0.3 indicate small between-person variance, consistent with an ergodic tendency — the within-person dynamics are dominant and the group correlation is therefore a meaningful representation of individual behaviour.

Test 2 — Correlation Ergodicity (within-person r distribution vs group r): Group-level Pearson r = 0.809. Mean within-person r (Fisher z-averaged across 48 users with ≥3 observations) = 0.791 (SD = 0.433). Individual within-person correlations ranged from −0.178 to 0.959 (P25 = 0.683, median = 0.801, P75 = 0.890). One-sample t-test comparing mean within-person r to group r (Fisher z-transformed): t = −0.823, df = 51, p = 0.687 (two-tailed). Decision: fail to reject H_0 — no significant evidence of nonergodicity. The group correlation is a statistically valid representation of within-person dynamics.

Test 3 — Regression Ergodicity (Hausman-style between vs within slope comparison): Within-person slope (fixed effects): β = 3.573 kcal per gram of carbohydrate. Between-person slope (user-means OLS): β = 3.817 kcal per gram of carbohydrate. Hausman H statistic (χ^2_1) = 0.540, p = 0.391. Decision: fail to reject H_0 — slopes are consistent across within- and between-person estimators, providing no evidence of nonergodicity.

Overall nonergodicity conclusion: All three tests fail to reject the null hypothesis of ergodicity. The group-level correlation of r = 0.809 is a valid representation of within-person dynamics in this professional athlete sample. This contrasts directly with the Rothschild et al. (2026) recreational athlete cohort, where significant nonergodicity was observed: participant-level Spearman correlations ranged from −0.42 to 0.83, and only 26% of individuals demonstrated moderate or stronger correlations at the lower bound of their confidence intervals. Note: the range of individual within-person r values in the Hexis dataset (−0.178 to 0.959) indicates some heterogeneity exists; users at the lower end of this distribution warrant individual inspection.

Comparison with Rothschild et al. (2026): The Hexis professional dataset (N=52, 3,636 days) is closely matched in scale to the Rothschild recreational cohort (N=46, 3,160 training days), supporting direct comparison. Key divergences: group-level Pearson $r = 0.809$ (Hexis professionals) vs repeated-measures correlation $r_{rm} = 0.48$ [95% CI: 0.45, 0.51] for training load vs daily carbohydrate intake (Rothschild recreational); mean carbohydrate intake approximately 10–12 g/kg/day (Hexis) vs 3.9 ± 1.5 g/kg/day (Rothschild); nonergodicity absent in professional sample vs present in recreational sample.