

Trail Running

Trail marathon to 100 km ultra. Downhills wreck the quads, and wrecked muscle is where cramps start.

Small numbers point to the sources on page 2.

1 Where cramps bite

- At Western States 100 miler, 14% of runners cramped and another 27% had near-cramping¹.
- Sites: calf 54%, quads 44%, hamstrings 33%¹.
- Crampers had higher muscle-damage markers (CK); weight loss, sodium tablets and blood sodium made no difference¹.
- A history of cramping made runners 2.5 times more likely to cramp again¹.
- Downhill running spikes CK to roughly six times baseline at 24 h and cuts force output for 3 to 4 days⁸.

2 Cut your risk

- Train the descents. Eccentric downhill work is the specific preparation trail cramps demand⁸.
- Race the pace you trained. Running faster than usual is the top cramp predictor⁴.
- Hike the steep climbs early to keep the calves fresh for later.
- Strength work (single-leg, step-downs) protects against the muscle damage that precedes cramp^{1,8}.
- Nothing prevents EAMC reliably for everyone, so stack the small edges².

3 When it hits

- Ease the pace before it locks. A twinge is your warning, not the cramp.
- Stretch the cramping muscle to full length and hold. Still the first-line response in every review².
- **Early, not late.** Take your GOAT Shot at the twinge. In the lab a small measured shot cut cramp duration to about 85 s against 134 s for water, through a mouth-to-nerve reflex rather than digestion³.
- Do not chug plain water to fix a cramp. Neither dehydration nor blood sodium separated crampers from non-crampers in field studies⁴.
- Once it releases, rebuild pace over 3 to 5 minutes. Straight back to race pace re-triggers it.
- The evidence behind this tactic is lab-based and mixed: Miller (2010) found a clear effect, later trials found a small or non-significant one¹⁰. What it is not: an electrolyte top-up. Test it in training, not on race day.

4 Fuel

- Carb load 10 to 12 g/kg/day for 36 to 48 h before⁶.
- Pre-race 1 to 4 g/kg carbohydrate, 1 to 4 h before⁶.
- Ultra guidance: 150 to 400 kcal/h, 30 to 50 g/h carbohydrate; up to 90 g/h if gut-trained and under 6 h^{5,6}.
- Mix gels with real food. Finishers ate more fat and more overall than non-finishers in long ultras⁵.
- GI trouble hits 30 to 50% of ultra runners, nausea most of all. Train the gut, avoid over-concentrated carbs⁵.

5 Fluid and salt

- Pre-load 5 to 7 ml/kg about 4 h out⁷.
- 450 to 750 ml/h, about 150 to 250 ml every 20 min, adjusted to heat and sweat rate⁵.
- Sodium 500 to 700 mg per litre of fluid, 300 to 600 mg/h in the heat. Most commercial products under-deliver⁵.
- Finish within 2% of start weight; over-drinking plain water is the hyponatraemia risk⁷.
- Caffeine around 50 mg/h helps late in long events if practised⁵.

6 Race day

- Taper 8 to 14 days, volume down 41 to 60%, keep intensity and frequency⁹.
- Mandatory kit list checked twice. Poles if allowed and trained with.
- Vest: gels, real food, GOAT Shot in a front pocket, salt, headtorch if the cut-off says so.
- Morning: eat 3 h out, tape and lube, arrive early.
- Run the first quarter conservatively. Cramps live in the back half.

Sources and the fine print

Every numbered claim on page 1 traces to one of these. Peer-reviewed studies and consensus statements only, no influencer opinion.

1. Hoffman MD, Stuenkel KJ. Muscle cramping during a 161-km ultramarathon. Sports Med Open 2015;1:24.

2. Maughan RJ, Shirreffs SM. Muscle cramping during exercise: causes, solutions and questions remaining. Sports Med 2019;49(S2):115-124.

3. Miller KC et al. Reflex inhibition of electrically induced muscle cramps in hypohydrated humans. Med Sci Sports Exerc 2010;42(5):953-961.

4. Schwellnus MP et al. Increased running speed and previous cramps rather than dehydration or serum sodium changes predict EAMC: 210 Ironman triathletes. Br J Sports Med 2011;45:650-656.

5. Tiller NB et al. International Society of Sports Nutrition position stand: nutritional considerations for single-stage ultra-marathon training and racing. J Int Soc Sports Nutr 2019;16:50.

6. Burke LM et al. Carbohydrates for training and competition (IOC consensus). J Sports Sci 2011;29(S1):S17-27.

7. Thomas DT, Erdman KA, Burke LM. Nutrition and athletic performance: ACSM / Academy of Nutrition and Dietetics / Dietitians of Canada position. Med Sci Sports Exerc 2016;48:543-568; Sawka MN et al. ACSM exercise and fluid replacement, 2007.

8. Coratella G et al. Downhill running increases markers of muscle damage and impairs the rate of force development. Eur J Appl Physiol 2024.

9. Wang Z et al. Effects of tapering on performance in endurance athletes: systematic review and meta-analysis. PLOS ONE 2023;18(3):e0282838.

10. Behringer M et al. Effects of TRPV1 and TRPA1 activators on the cramp threshold frequency: randomised placebo-controlled trial. Eur J Appl Physiol 2017;117:1641-1647; Lavender AP et al. Mouth rinsing vs ingesting pickle juice. Appl Sci 2021;11:12096.

GOAT Shot, plainly

A 10 mL single-serve shot of Australian organic apple cider vinegar with the mother, saltbush brine and native botanicals, in a small thin sachet that opens easily. A food, not a medicine.

The research above (Miller 2010; Behringer 2017; Lavender 2021) is what the twinge tactic on page 1 is built on. Read it and make your own call.

Test any race-day tactic in training first. That includes this one.

Pickled GOAT is a food under the Food Standards Australia New Zealand code. It is not a therapeutic good and is not intended to diagnose, treat, cure or prevent any condition. This guide is general information for healthy adults, not medical advice. If cramps are frequent, severe or happen at rest, see a sports doctor. Informed Sport and HASTA certification are stated goals and are not currently held.

HERD members only. Passed on by a mate? Join the HERD at pickledgoat.com and every BLEAT lands in your inbox. Your sign-up answers, event, distance and where you cramp, decide which BLEAT we write next. Tell us and we will bleat back.