

Lowlanders Ski Racing: Nutrition, Hydration, Recovery, and Warm-Up Protocol

Nutrition	2
Macronutrients	2
Fat	3
Carbohydrates	3
Timing of intake	4
Which carbohydrates?	4
Glycemic index	4
Proteins	5
Vitamins and minerals	5
Hydration	6
Guidelines	6
Nutrition supplements	7
Strength training	7
Protein supplement	7
Creatine supplement	7
Conditioning and on camps	8
Carbohydrates	8
Minerals and vitamins	8
Competition	8
Creatine	8
Recovery	9
Sleep	9
Recharging	9
Active recovery	9
Passive recovery	10
Warm-up on camps and competitions	10
1 basic warm-up (5 - 10 min)	10
2 free skiing (2 - 3 runs)	10
3 inspection	11
4 stationary warm-up (10 - 15 mins)	11
5 races or training start	12
Pre-boot warm-up	12
Competition warm-up	12
Pre-competition priming	12

Nutrition

What you eat, when you eat, and how much you eat has a direct influence on your performance in training and competition and also your general health. That goes for both dryland training and on-snow training.

By planning your diet you can maximize the outcome of your training, and ensure the worth of the hours you spend in the gym and on snow. Diet also affects your ability to recover from one training session to another, and a healthy diet prevents injuries and illness.

Nutritional needs are independent and are influenced by body composition, sex, age, training type, training intensity, and training volume. This guide describes your needs based on your training type, intensity, and volume. The rest is individual and you have to adjust to your personal needs.

In general, it is important to vary your diet, as a one-sided diet doesn't cover all nutritional needs.

In the attempt to optimize diet, there is a risk of developing an unhealthy relationship to nutrition. If you feel like that is happening, contact your coach or other key persons around you. Your mental and physical health is first priority.

Here is some general advice for your nutrition:

- Be open to new foods and new recipes.
- Eat according to the season, which gives variation.
- Vary your sources to carbohydrates and protein.
 - Carbohydrate sources: Rice, pasta, potatoes, bread, and grains.
 - Protein sources: Meat, poultry, seafood, eggs, milk products, and legumes.
- Eat fish.
- Include all types of foods in your diet.
- Eat fruit and vegetables for every main meal.
- Colors in fruit and vegetables are a sign of high amounts and different vitamins, minerals, and antioxidants. Eat like a rainbow! or... in other words, vary the fruits and vegetables you eat based on the color.

Macronutrients

All food is made up of nutrients. We call the main one macronutrients, and they are:

- Fat
- Carbohydrates
- Protein

The macronutrients support different processes in the body, and therefore you can adjust your intake to which process in your body you want to support.

Fat

Fat has different functions in the body; building cells, hormone production, helping absorb vitamins, and serving as an energy source. Basically fat is important, but not too much and also not too little.

Aim for 20 - 30 % fat in your diet. Prioritize unsaturated fat.

Unsaturated fat comes from fatty fish, and vegetable foods like nuts, oils, and avocado.

Saturated fat, which is in general not good for your health comes from animal food like meat, butter, and fat dairy products.

When training, go for meals with low fat and prioritize unsaturated fat in normal meals.

Carbohydrates

Carbohydrates are the main fuel for training and recovery. The body also uses fat as an energy source, but carbohydrates are the main energy source for training and recovery. Carbohydrates are stored as glycogen, and the glycogen depots in your body have to be full before each training session. The best way to fill them up is to not empty them, and focus on filling the depots straight after training.

The amount of carbohydrates in your diet should match your daily level of exercise:

Training volume and intensity	Carbohydrates pr. kg. body weight
Low intensity. Technical training with low heart rate or easy dryland training. Optimal if aiming for weight loss.	3 - 4 g
Moderate intensity. A half-day on-snow training and a dryland session with moderate intensity.	4 - 6 g
High intensity. A full day of high-intensity training, both technical and in gates, and a dryland session regardless of moderate or high intensity. The optimal day-to-day intake on camps. Also, optimal after camps to fill depots before dryland	6 - 9 g

training sessions.	
--------------------	--

Timing of intake

If there are more than 8 hours between training sessions, the timing of carbohydrate intake is not that important. If there are less than 8 hours, the timing is important. Here are some rules to follow:

Before training (1 - 4 hrs): 1 - 4 g pr. kg. bodyweight

During training > 1 hour: 1 g pr. kg. bodyweight pr. hour.

After training: 1 g pr. kg. bodyweight

With less than 8 hours to the next training, eat straight after training. Eat around 1 g pr. kg body weight.

After training, eat carbohydrates in small series with 20 - 60 minutes in between.

Which carbohydrates?

In general, choose carbohydrates from

- Fruit
- Bread
- Pasta
- Biscuits (low fat)
- Juice

The above carbohydrates are nutritious.

Add a protein source from dairy or meat. More about proteins below.

Examples of 50 - 75 g carbohydrates of 15 - 20 g protein:

- 500 ml cocoa drink
- 400 g yogurt + 2 dl muesli
- 2 bananas +
- 250 g rice/pasta + 75 g meat/fish/poultry
- Sandwich with 100 g bread incl. meat + banana

Glycemic index

Foods have different glycemic indexes. A nutrition source with a **high glycemic index** is a quick source of energy after training. Prioritize foods with a high glycemic index after training and for recovery. This is for instance:

- Sports drinks + energy-rich beverages
- White bread
- Banana and dried fruit
- Low-fat biscuits

- Sugar, jam, and honey
- Most breakfast products
- Rice, pasta, potatoes
- Rice biscuits

If in doubt just google the glycemic index of your food - most are available online.

Above 70 is **high**

Between 55 - 70 **medium**

Lower than 70 is **low**

Look for the above foods to eat straight after training.

Proteins

Protein plays a crucial role in regards to how the body reacts to training. Proteins are made of amino acids, which are the building blocks for new tissue - importantly muscle tissue. They are also building blocks for hormones and enzymes, and support the immune system. Protein also works as energy for working muscles, but only on a quite small scale. Research is still being done on the optimal protein intake, but it is still not clear, and different research shows different results. Although, there are a lot of indications in the present literature, and here are the recommendations.

Aim for 1 - 2 g protein per kg body weight.

If you aim for muscle growth, don't be afraid to exceed 2 g a little, but no evidence indicates that more than 2 g encourages more muscle growth. On the other hand, it makes the diet expensive, and you may consume protein on behalf of carbohydrates, fat, or water.

Foods with 10 g protein:

- 2 eggs
- 300 ml milk
- 30 g cheese
- 200 ml yogurt
- 35 - 50 g meat, fish, or poultry
- 40 g lentils

Make sure you get enough protein, especially on camps where hotels influence food options.

Vitamins and minerals

In general, it is possible to meet recommendations for minerals and vitamins with a normal mixed diet.

Important **minerals** are **iron, magnesium, and calcium.**

Important **vitamins** are vitamin **A, B6, B12, C, D, and E.**

As mentioned above, a varied and mixed diet gives you the necessary vitamins and minerals. **When staying in hotels on camps, vary your diet!**

In certain situations, you can be in lack of vitamins and minerals. This can be the case when traveling to places with limited food options. If that case, a nutrition supplement can be a good addition for some time.

Hydration

Hydration plays a great role in terms of performance, and also in recovery. To little intake of water can lead to dehydration and overheating of the body, which in some cases can limit performance.

The risk of dehydration is mainly relevant in training, and especially in spring when temperatures are high. It is individual from racer to racer, and clothing, sun, and air humidity play a role as well. Therefore, you need a somewhat strategy for hydration.

Guidelines

Before training

Start hydrated before training. This means drinking water for breakfast and staying hydrated during the day if you have a training session later during the day.

Watch your urine. If you pee less than normal, it is a sign that you are lacking water. Also, watch the color. If it is darker than usual it is a sign that you are lacking water.

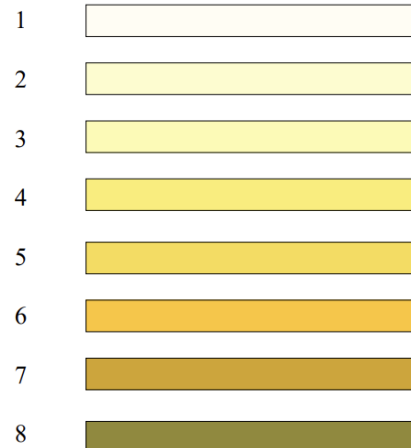
If your urine is color 5 - 8, is it probably because you need to take action and hydrate yourself. Don't aim for 1, then you have to pee all the time, but drink a little during the entire day to stay around 3 - 4. In the morning, your urine is typically darker than during the day, so don't be fooled by that.

During training

You need both water and carbohydrates (1 g per kg body weight when training with high intensity). This can be combined in a sports drink, or it can be a combination of water and a snack. It is important with carbohydrates, as it keeps your blood sugar high and that also helps the brain to concentrate and focus.

After training

You must replace the water you sweat away during training. When it is cold, you sweat less, and when it is warm you sweat more. To test how much you sweat, you can weigh yourself before and after training. The goal would be to replace 1,2 - 1,5 liter of water per kg body weight you lose during training.



Restitution after training is preparation for the next training!

As mentioned, how much water you lose during training is individual, so here's advice on how to adjust your water intake.

Nutrition supplements

Nutrition supplements are a good way of supporting your energy intake. As the name says, nutrition supplements are supplements, and should not replace a normal healthy diet. When that is said, nutrition supplements are often easily accessible, and in some situations, it will be beneficial to use supplements.

Strength training

Protein supplement

When strength training, you need more protein than usual. In that case, it can be beneficial to support your diet with a protein supplement. This can be in form of protein powder or a protein bar.

What: Go for whey 100 protein powders, and go for good quality protein powder. If allergies try soy protein.

Amount: 25 - 30 grams of protein after working out.

Timing: Straight after your workout.

Creatine supplement

When strength training, creatine is a good supplement as well. Creatine works as a source of energy and is stored straight in the muscles. This gives you the possibility to train under a higher load (more weight), and that will likely induce muscle growth.

When using creatine you need a loading phase, to fill up depots in the body.

What: Pure monohydrate creatine.

Amount: 0,2 g per kg body weight for 5 days, and 0,04 g per kg body weight afterward to maintain creatine in the body.

Timing: Straight after your workout.

Conditioning and on camps

Carbohydrates

When you are training for conditioning and training skiing on camps, your main energy source is carbohydrates. Here, it can be beneficial and comfortable to support your diet with carbohydrates during and after training.

What: Weight gainer powder, sports drinks with carbohydrates, foods with a high glycemic index, or bars with a high amount of carbohydrates.

The amount for conditioning training: 1 g per kg body weight per hour of training. 1 g per kg body weight after training.

The amount for skiing training: 1 g per kg body weight per half-day of training. 1 g per kg body weight after training.

Timing: Straight after training, or in small portions during training.

Minerals and vitamins

When training for conditioning or skiing training, it is important to stay fueled with vitamins. It helps your brain work properly, and helps the activation of the muscles, and prevents cramps.

What: Tablets with electrolytes. Example:

<https://highfive.co.uk/products/zero?variant=39896116756639>

Amount: One tablet per day to support a normal diet.

When: In the morning as part of your breakfast.

Competition

The guide from above for conditioning and on camps also goes for competition. To enhance performance during competition, there are only a few nutritional supplements that have been shown to have an effect. Caffeine is widely used for endurance sports, natron can be used for sports like sprinting, and creatine is coming up as a performance-enhancing supplement for anaerobic activities - like skiing.

Creatine

Besides supporting muscle growth and strength, creatine has an acute effect on performance. It is highly relevant for skiing, as it improves the anaerobic working capacity, which is very much in play in SL and GS.

The acute performance-enhancing effect comes just as the loading phase is finished. That means 5 days after the first intake. On the other hand, creatine slightly changes the body

composition, and you will gain a little weight. This is a trade-off, where you have to try it out for yourself, and see if it works for you.

For SG and DH, there may as well be marginal gains to catch with creatine.

What: Creatine monohydrate

Amount: 0,25 g per kg bodyweight for 5 days, with day 6 being competition day. If already loaded with creatine it may also work.

When: In the morning with your breakfast or straight after training.

Results show that the effect of creatine is individual, why you have to test it yourself to see if it works for you.

Recovery

Recovering from one training session to the other is crucial. Especially on a skiing camp, it is important to be ready for the next skiing session. Besides nutrition and hydration, also sleep and recharging play a great role, and we can use active and passive recovery to get ready for the next training.

Sleep

Sleep is very important. When sleeping, the brain learns and remembers stuff. With good sleep habits, you have an edge over your competitors:

- Sleep 8 - 9 hours, with good quality.
- Ditch the phone at least half an hour before going to bed.
- Change sleep patterns as little as possible.
- Avoid caffeine 6 hours before sleep.

Recharging

Being a ski racer gives pressure from different sides; work, school, family, friends, yourself, coaches, etc. It is important to be in a good mental state to be able to learn and improve.

When stressed, contact your coach immediately.

- Feel which activities give you energy, and prioritize those.
- Remember social stuff
- Use 15 minutes a day for focused mental recharging.
- Evaluate each training session, to be able to learn from the session, and move forward and focus on the next session. Close the training session.

Active recovery

- 10 - 15 minutes of moderate activity. 50 - 60 % heart rate.
- Dynamic stretching:
 - 3 x 15-sec stretches of lower legs, thighs, and back.

Passive recovery

- Cold bath - 5 - 10 minutes in cold water, or with legs in cold water (10-15 degrees).
- Compression socks
- Massage (gun). Focus lower legs, thighs, and back.
- Mindfulness

Warm-up on camps and competitions

Before starting a training session or a competition, it is important to be properly warmed up. It lowers injury risk and enhances performance. Here's a guide on how to:

1 basic warm-up (5 - 10 min)

Before starting skiing, go for a short basic warm-up. Build a routine, where you incorporate some of the following exercises.

4 exercises, 3 sets of 15 reps, with 20 sec break in between:

- Squats
- Deadlifts
- Good mornings
- Push-ups
- Plank up and downs
- Lunges
- Squat jumps
- Jumping lunges
- Back extensions

2 free skiing (2 - 3 runs)

Warm-up with slow skiing on the slopes. Practice what you are working on in the gates, but do it at a low speed. Start with a slow run, focusing on technical stuff. Afterward, you can incorporate a drill to support what you are practicing, and also to warm up and prime your nervous system.

Warm-up drills:

- Javelin turns (crossing inside ski over outside ski).
- Lifting the back of the inside ski.
- Skiing without poles:
 - Hands in front.
 - Hands in hips.
 - Hands-on head.
 - Hands-on shoulders.
- Garlands to practice turn initiation.
- Basic parallel turns.

3 inspection

After some free skiing, inspect the course. When inspecting a course, use the inspection as training. You inspect courses way less than the number of runs you put in, and therefore it is crucial to use course inspection as practice in inspecting courses.

A common strategy is to remember tricky sections. When you identify a tricky section, don't be afraid to spend time visualizing that bit of the course, when standing on the course. See yourself skiing the course, then it will be easier to remember when skiing to course.

4 stationary warm-up (10 - 15 mins)

Warming up stationary is beneficial. The injury risk is significantly lower when warming up in safe conditions, and it is crucial to be able to do your best run.

Focus on the joints important for skiing; ankles, knees, hips, and spine.

Aim for getting your heart rate up to 70 - 80 % of maximum.

Warm-up exercises. 5 exercises, 3 sets of 15 reps, with 20 sec in between.

- Leg swings
- Leg shaking
- Rotation the knee in circles
- Good mornings (rubber band)
- Squats (rubber band)
- Squat jumps
- Lunges forward
- Lunges sideways
- Jumping from one leg to another
- Worlds best stretch
- Plank up and downs
- Dynamic stretching
- Rotation of upper body (rubber band)
- Rubber band pulls
- Push-ups
- V-ups / crunches
- Uphill sprints
- Neck rolls
- Etc.

Do 3 sets of 15 reps for 5 exercises with 15 - 20 sec rest in between. Build a warm-up routine that works for you, and don't be too eager to be the first in the course. The warm-up is more important, and you can have as many runs as your coach lets you when you start skiing.

5 races or training start

10 - 15 minutes before training or competition start, do what you have to do to perform. Get your gear ready; clean boots and skis and zip zippers. Then, focus, breath deeply, visualize the course, click in and go!

Pre-boot warm-up

If you have the chance to warm up before you boot up, use the opportunity. If you are in a ski-in ski-out location, large lift-area, large restaurant, or whatever, you can warm up with the above exercises just before booting up, and you will have saved some time with a stationary warm-up.

Competition warm-up

Depending on the start number, you will have more or less time to warm up for a competition. After the inspection, you may have time to stationary warm-up followed by fast skiing with a focus on your race run. If possible see if you can get in about 3 runs skiing fast.

Pre-competition priming

Pre-competition priming is a fairly new term in sports. It is a type of performance booster, where the brain and nerves are getting “warmed up” before a competition. Research shows that heavy lifting 4 - 6 hours before competition can improve physical performance. Here’s a guide:

When: 4 - 6 hours before competition start.

What: 3 x 3 back squat + 3 x 3 power clean. Both at 60 - 80 % 1RM.

The result is individual, but for some racers, it may be beneficial to do pre-competition priming. Test it yourself, to see how it feels and what works for you. It depends on what gear you have available and when the competition start is.