



Nutrition for Hockey

Hockey is mainly an aerobic sport with short bursts of high intensity sprinting. Energy requirements for hockey players vary greatly depending on the standard of play. Overall, the training diet for a hockey player needs to be based on nutrient-rich sources of carbohydrate with moderate levels of protein and smaller amounts of fat.

Eating well all the time is important. *The correct diet won't make an average hockey player elite but a poor diet can make an elite hockey player average.* Everyday food patterns are more important than focusing on what you eat the meal before a big game. Eating well the night before you compete won't compensate for poor eating patterns in the previous weeks or months.

Carbohydrate

Carbohydrates are the major source of fuel for *everyone* especially athletes. Carbohydrate is a key nutrient for active hockey players. The critical source of energy for exercising muscles is the body's carbohydrate stores – a little from blood glucose and a larger amount from glycogen stored in the muscles. The body can only store a limited amount of glycogen so it is essential to eat Carbohydrate every day.

Carbohydrates are foods such as breads, cereals, fruits, starchy vegetables, pulses and beans. Nutrient-rich sources of carbohydrate include cereals, fruit, vegetables, low fat dairy products (eg flavored yoghurt) etc. Nutrient-poor carbohydrate foods such as sugar, cordial, soft drink, lollies, cakes etc. should be eaten in smaller amounts.

Sport Nutritionists recommend Carbohydrates make up more than half the total energy intake of athletes.

How much Carbohydrate do hockey players need?

The amount of carbohydrate needed depends on body weight and the intensity of training and games.

Hockey players need, on average, 7-8 grams of carbohydrate per kilo of bodyweight per day (eg a 60 kg hockey player needs 420 - 480g of carbohydrate per day, a 70 kg player needs 490 - 560g/day etc.)

Regular consumption of carbohydrate-based foods at all meals will allow refueling of muscle glycogen stores. Most important times are following training and games, to assist with recovery from each session. One game of hockey may not fully deplete an athlete's glycogen stores if starting with a full supply, but if the daily diet provides inadequate amounts there may be difficulty in performing optimally.

The following chart provides information about the carbohydrate content of common foods. Each food portion provides 50g of carbohydrate. These carbohydrate-rich foods should form the basis of meals and snacks, with other nutrient-rich foods added to round out the meal.

CEREAL Wheat biscuit cereal (e.g. Weet Bix) 'Light' breakfast cereal (e.g. Cornflakes) 'Muesli' flake breakfast cereal Toasted muesli Porridge - made with milk Porridge - made with water Rolled oats	60g (5 biscuits) 60 g (2 cups) 65 g (1-1.5 cups) 90 g (1 cup) 350 g (1.3 cups) 550 g (2.5 cups) 90 g (1 cup)
Bread Bread rolls Pita and lebanese bread Chapati English muffin Crumpet	110 g (4 slices white or 3 thick wholegrain) 110 g (1 large or 2 medium) 100 g (2 pita) 150 g (2.5) 120 g (2 full muffins) 2.5
Muesli bar Rice cakes Crisp breads and dry biscuits Fruit filled biscuits Plain sweet biscuits Cream filled/chocolate biscuits Cake style muffin Pancakes Scones Iced fruit bun Croissant	2.5 6 thick or 10 thin 6 large or 15 small 5 8-10 6 115 g (1 large or 2 medium) 150 g (2 medium) 125 g (3 medium) 105 g (1.5) 149 g (1.5 large or 2 medium)
Rice, boiled Pasta or noodles, boiled Canned spaghetti	180g (1 cup) 200 g (1.3 cups) 440 g (large can)
FRUIT Fruit crumble Fruit packed in heavy syrup Fruit stewed/canned in light syrup Fresh fruit salad Bananas Large fruit (mango, pear, grapefruit etc.) Medium fruit (orange, apple etc.) Small fruit (nectarine, apricot etc.) Grapes Melon Strawberries Sultanas and raisins Dried apricots	1 cup 280 g (1.3 cups) 520 g (2 cups) 500 g (2.5 cups) 2 medium-large 2-3 3-4 12 350 g (2 cups) 1,000 g (6 cups) 1,800 g (12 cups) 70 g (4 Tbsp) 115 g (22 halves)

VEGETABLES Potatoes Sweet potato Corn Green Beans Baked beans Lentils Soy beans and kidney beans Tomato puree Pumpkin and peas	350 g (1 very large or 3 medium) 350 g (2.5 cups) 300 g (1.2 cups creamed corn or 2 cobs) 1,800 g (14 cups) 440 g (1 large can) 400 g (2 cups) 400 g (2 cups) 1 litre (4 cups) 700 g (5 cups)
DAIRY PRODUCTS Milk Flavoured milk Custard 'Diet' yoghurt and natural yoghurt Flavoured non-fat yoghurt Ice cream Fromage frais Rice pudding/creamed rice	1 litre 560 ml 300 g (1.3 cup or half 600 g carton) 800 g (4 individual tubs) 350 g (2 individual tubs) 250 g (10 Tbsp) 400 g (2 tubs) 300 g (1.5 cups)
SUGARS and CONFECTIONERY Sugar Jam Syrups Honey Chocolate Mars Bar and other 50-60 g bars Jubes and jelly babies Heards Barley sugars	50 g 3 Tbsp 4 Tbsp 3 Tbsp 80 g 1.5 bars 60 g 50g
MIXED DISHES Pizza Hamburgers Lasagne Fried rice	200 g (medium -1/4 thick or 1/3 thin) 1.3 Big Macs 400 g serve 200 g (1.3 cups)
DRINKS Fruit juice - unsweetened Fruit juice - sweetened Cordial Soft drinks and flavored mineral water Fruit smoothie	600 ml 500 ml 800 ml 500 ml 250-300 ml
SPORTS FOODS Sports drink Carbohydrate loader supplement Liquid meal supplement Sports bar Sports gels Glucose polymer powder	700 ml 250 ml 250-300 ml 1-1.5 bars 2 sachets 60 g

(from Peak Performance: training and nutritional strategies for sport J. Hawley and L. Burke. Sydney: Allen & Unwin, 1998.)

The Glycaemic Index

The Glycaemic Index (GI) is an indicator of the effect carbohydrate food has on the body. It describes the rate carbohydrate is digested and its influence on blood sugar .

Low GI foods are digested and absorbed slowly and glucose released into the bloodstream over a long period of time. This may extend endurance and allow for a longer exercise session and improved performance in an endurance event. Ideally these are eaten before the training session or game.

High GI foods are digested and absorbed quickly raising blood sugar levels rapidly over a short period of time. They can be used during or after an event to provide energy fast.

Low GI foods (eat before)	Moderate GI Foods (during and after event)	High GI Foods (during and after event)
Baked beans	Muesli Bar	Sports drinks
Brown bread	Rice Bubbles	Sports gels
Muesli	Cornflakes	White bread
Porridge	Brown rice	Weetbix
Pasta	Ripe banana	Jelly Beans / Sweets
Long grain white rice	Kiwifruit	Honey
Most fruits	Pineapple	Glucose
Apple or Orange Juice	Melon	Baked potato
Milk	Pita Bread	Pumpkin
Yoghurt	Crumpet	Water crackers

Protein

Protein is essential for growth and repair of all body tissues including muscle and bone. It is involved in carrying oxygen around the body, production of hormones and other enzymes, and in supporting the immune system.

Protein can also provide energy if glycogen stores in muscles and the liver are low but if it is used this way, it is then not available for the important job of muscle growth, repair and recovery. Coaches and athletes should be wary of low carbohydrate / high protein diets for this reason. Nutritionists advise that Carbohydrate should contribute 50-60% of energy needs.

Athletes have a slightly higher need for protein than the average person because of the wear and tear on bodies as a result of training and playing games.

How much Protein do hockey players need?

Ideally 15% of the energy intake should come from protein. Athletes who are growing, such as adolescents, have additional protein requirements around 2 grams of protein per kilo of bodyweight per day. (60 kg hockey player = 120 grams of protein per day, 70 kg = 140 grams etc)

The following table indicates the protein content of many basic foods. Many people typically turn to meat, poultry and dairy products to obtain protein. Don't forget that plant foods such as bread, pasta, rice, breakfast cereal, legumes,

lentils and nuts also contribute significant amounts of protein to the overall diet. Remember also, that many common foods or mixed dishes are made up of these basic ingredients. For example, we sometimes forget that custard or rice pudding is made with milk, or that meat or chicken are in the sandwich filling, or pasta sauce. Mixing and matching foods is a good way to team up protein, carbohydrate and other nutrients. Ideally, a mixture of protein sources should be included in the diet, and distributed at each meal and snack over the day.

Each of the following foods provides approximately 10g of protein. These foods have moderate to low fat content and are rich in other nutrients.

Animal Foods	Plant Foods
2 small eggs 30 g (1.5 slices) reduced fat cheese 70 g cottage cheese 1 cup (250 ml) low-fat milk 35 g lean beef, lamb or pork (cooked weight) 40 g lean chicken (cooked weight) 50 g grilled fish 50 g canned tuna or salmon 200 g reduced fat yoghurt 150 g light fromage frais	4 slices (120 g) wholemeal bread 3 cups (90 g) wholegrain cereal 2 cups (330 g) cooked pasta 3 cups (400 g) cooked rice 3/4 cup (150 g) lentils or kidney beans 200 g baked beans 120 g tofu 400 ml soy beverage 60 g nuts or seeds 1 cup (250 ml) soy milk 100 g soy meat

Animal sources of protein such as lean red meat also provide a good source of iron, zinc, vitamin B and the essential amino acids the body needs.

It is possible to consume enough protein from plant sources however vegetarians should take care in combining foods to obtain enough high quality protein. Further information on vegetarian diets for athletes can be obtained on The Australian Institute of Sport website.

Coaches and athletes should be aware of the dangers of excess protein in the diet. It can place strain on kidneys and increase risk of dehydration. A diet high in protein can also increase calcium loss which may lead to weakened bones.

Many athletes do not realise that it is possible, and beneficial, to consume a diet that achieves the muscle's carbohydrate fuel needs, as well as providing a protein intake that easily meets the increased protein needs for sport. In fact, in many situations, a meal or snack providing a combination of carbohydrate and protein is the best way to meet sports nutrition goals. These nutrients should be teamed-up, over the day, and at specific times, to achieve an optimal eating plan.

The following menu plan shows food choices that achieve high carbohydrate and protein intakes simultaneously.

	Quantity of food required to provide high carbohydrate and high protein needs for a 70 kg athlete	Amount of Carbohydrate (g)	Amount of protein (g)
Breakfast	2 cups cereal	39	6
	300 ml milk	16	12
	2 slices toast	30	8
	2 tablespoons jam	36	0
	1 cup juice	19	2
Lunch	2 bread rolls each with 50 g chicken + salad	78	41
	1 banana	20	2
	1 fruit bun	34	6
	250 ml flavoured low fat milk	17	13
Dinner	Stir-fry with 2 cups pasta + 100 g meat + 1 cup vegetables	100	50
	1 cup jelly + 1 cup custard	82	13
Snacks	750 ml sports drink	51	0
	1 carton yoghurt	33	10
	1 piece fruit	18	1
	1 cereal bar	24	2
Analysis		594 g 8 g/kg	166 g 2.3 g/kg

Source: Department of Sports Nutrition, AIS www.ais.org.au/nutrition

Are protein supplements useful?

Generally, athletes can obtain all the protein they require from a good mixed diet with approximately 15% of the energy coming from protein. Many protein supplements are very expensive due primarily to the amount of marketing that accompanies products. They tend to provide very large amounts of protein and little other nutrients. There is no need for the amount of protein provided by many supplements and there is certainly no justification for the extra cost. The most suitable supplement is one that provides both protein and carbohydrate. Homemade fruit smoothies are a good alternative to commercial protein supplements.

Fat

Dietary fat plays an important role in the body including insulation from the cold and aiding in the absorption and transportation of the fat-soluble vitamins A, D, E and K.

Fat has over twice the energy value of carbohydrates or protein. It is a concentrated form of energy so it is easy to eat more than is needed. Excess fat contributes to weight gain, heart disease and a wide variety of other health problems. It is commonly thought that people who are highly active can eat more fat because they burn off the excess. This is true in the sense that physical activity uses more energy but research indicates there are increased risks of adverse effects later in life.

How much Fat do hockey players need?

1 gram of fat per kilogram of bodyweight up to a maximum of 90 grams per day eg a 60kg person needs about 60g fat.

The following table shows the typical fat content of a sample of foods.

80g lean beef mince	5g
1 lean grilled lamb chop	5g
1 scone	5g
2 chocolate biscuits	6g
1 regular muesli bar	6g
1 slice pizza	10g
50g packet potato chips	18g
1 croissant	23g

Source: A Winning Diet, Nestle New Zealand Limited, 2002

Tips to reduce saturated fat:

- ✓ Buy lean red meat and trim all visible fat
- ✓ Remove skin and fat from chicken before cooking
- ✓ Choose low fat dairy products (milk, yoghurt, cheese)
- ✓ Limit high fat snacks (chips, chocolate, fried foods)
- ✓ Use low fat cooking methods eg bake, grill, steam, microwave
- ✓ Use vegetable oils eg olive and canola instead of butter

Fluids

Each day we need to replace about 2 litres of fluid to balance general body losses – even before sweat losses are taken into account. Sweating is the body's way of getting rid of heat generated by exercise and sweating rates increase as the work becomes harder or the environment becomes hotter.

Thirst should not be used as an indicator for fluid intake. By the time you are thirsty you are already dehydrated. Signs and symptoms of dehydration include lethargy and fatigue, dry mouth and shaking. Dehydration results in poor decision-making, lack of co-ordination and decreased motivation.

As a rule of thumb, when well hydrated a hockey player's urine should be clear in colour.

Tips to ensure good hydration:

- ✓ Drink water at every meal. Don't overlook water as a great choice.
- ✓ Keep a supply of fluids on hand during the day especially during hot weather. Carry a water bottle – don't share for hygiene reasons!
- ✓ Get a feel for sweat losses during training; wearing minimum clothing weigh yourself before and after the session (once towel dried). Weight changes don't mean you've lost weight/fat they simply reflect dehydration. Each kilo of weight 'lost' is equal to 1 litre of fluid. Ideally fluid loss over a training session or game should be kept to 1kg of weight (or 1L of fluid) or less by drinking as often as practical during the session.
- ✓ Rehydrate quickly after training or a game. Remember you will continue to lose fluid over the recovery time through urine losses and continued sweating. Typically you will need to drink 1.5 times your fluid deficit over the next 1-2 hours to return to fluid balance eg if you are 1kg lighter at the end of the session you will need to drink 1500ml (1.5L) to ensure you are fully hydrated.
- ✓ Be responsible with alcohol, remember alcohol has a dehydrating effect on the body as does caffeine in tea and coffee.

Competition nutrition: eating to win

Competition nutrition is more than just having a 'good' meal before a big game. Eating a high carbohydrate meal the night before will not replace or compensate for poor eating patterns in the previous weeks or months nor will it replace muscle glycogen stores. The energy from the pre-competition meal will not reach the muscles in time to assist performance.

The following strategies are helpful to gain that winning edge:

1. Fuel up beforehand

Fuelling up body carbohydrate stores is a key part of competition preparation. 24 hours of tapered training or rest, together with high-carbohydrate eating will ensure well-stocked muscle fuel stores. Hockey NZ does not recommend carbohydrate loading (an extended period of fuelling up) for hockey players as activity profiles suggest muscle glycogen stores are not depleted in 70 minutes of game time. In a tournament situation however, a high carbohydrate diet is recommended to safeguard against inadequate energy reserves.

2. Eat a high carbohydrate pre-game meal

The pre-event meal provides a final opportunity to top-up fuel and fluid levels. A high-carbohydrate, low-fat meal or snack is the perfect choice for a pre-event meal. It is best to eat bigger meals 3-4 hours before you compete, although a light snack can usually be eaten 1-2 hours before warming up.

Examples of high-carbohydrate, low-fat pre-event meals
• Breakfast cereal + low fat milk + fresh/canned fruit
• Muffins or crumpets + jam/honey
• Pancakes + syrup
• Toast + baked beans (note this is a high fibre choice) or tinned spaghetti
• Creamed rice (made with low-fat milk)
• Rolls or sandwiches with banana filling
• Fruit salad + low-fat fruit yoghurt
• Pasta with tomato or low-fat sauce
• Baked potatoes with-low fat filling
• Sports bars or cereal bars & sports drink
• Fruit smoothie (low-fat milk + fruit + low-fat yoghurt/icecream)
• Liquid meal supplement

3. Eat and drink to recover quickly after games

Most competition schedules call for rapid recovery between events. Refuelling and rehydrating should become 'the norm' in your post competition activities. Don't waste important time straight after the event when your body is most receptive to fluid, carbohydrate and other recovery nutrients. There is a magic window of 30 minutes after the game during which time carbohydrate rich foods or drink should be consumed. It is recommended that 1g of carbohydrate per kg of body weight is eaten to assist with recovery. Sports drinks containing carbohydrate and electrolytes will help with speedy recovery. It is also recommended that the recovery snack contains some protein to help with muscle tissue repair, growth and development.

4. Avoid dehydration

Unless sweat losses are replaced during exercise, an athlete will become dehydrated. Severe levels of dehydration have a dramatic effect on exercise performance but even small fluid losses reduce performance resulting in decreased work output and deterioration in skills and concentration. A good fluid intake is a crucial part of your competition strategy. Practice drinking in training so you know what feels comfortable. Fluid intake can be encouraged by making drinks cool and palatable.

Meal Plans for a Morning Game

For early morning games the food eaten in the preceding 24 hours is critical. It is important to ensure recovery from earlier games by adequate replacement of fluid losses and eating a high-carbohydrate recovery snack following the game. Athletes should try to have something to eat and drink as soon as possible after the match, even in the changing rooms. Men should try to eat around 70-85g of carbohydrate, women 50-70grams (refer to the carbohydrate content list earlier in this section). Typically for both men and women this carbohydrate top-up could be provided by 500ml of sports drink (35g), a banana (30g) and/or a muesli bar (20g).

Following the game a high-carbohydrate meal should be eaten, ideally within 2 hours. Later on in the afternoon following the game eat low-fat, high-carbohydrate snacks such as noodles, muffins, fruit, fruit loaf, fruit smoothies, yoghurt and fruit etc. These foods will help top up glycogen stores in preparation for the next game.

Dinner at night should be high in carbohydrate with additional sports drink, fruit juice or other fluids on offer.

Breakfast on game day should provide a top up for blood sugars. There is no time at this late stage to boost or restore muscle glycogen stores. To ensure blood sugars have returned to normal before the game aim to eat breakfast 2-3 hours prior to the game. Keep food low in fat and eat what feels comfortable. Protein foods such as yoghurt and a boiled or poached egg are also fine.

Athletes with a nervous stomach should eat light carbohydrate foods such as white toast, rice bubbles, banana on toast, stewed fruit or drink a glass of Sustagen or Complan made with low fat milk.

Avoid muesli and cooked breakfasts which are high in fat as these delay the transfer of carbohydrate from the stomach into the digestive system and muscles. Fat in particular slows the digestive system.

Drinking a couple of glasses of water starts the pre-hydration phase. Sip water or sports drink as you prefer until the game starts. For those hockey players who are unable to eat sufficient food prior to the game, drinking two glasses of sports drink is advised. Be careful with fruit juice as this tends to be high in fructose (a fruit sugar which can cause gastro-intestinal discomfort in some people). Continue drinking where possible during and after the game.

Meal Plans for Evening Games

It is unlikely at secondary school level that evening games will be played but in the event a game was scheduled as late as 6pm (or even later), the aim would be to eat breakfast and lunch as per usual followed by snacks in the afternoon and a light meal 3-4 hours prior to the game (almost like a double lunch). Eat foods that are comfortable (potato, rice dishes, breads and sandwiches, rolls, muffins, lean meats, banana, spaghetti, sport drinks and juices). Take fluids and snacks to the game to eat in recovery.

Remember that players will need to have a high-carbohydrate evening meal after the game to restore fuel supplies and replace fluid losses. This is very important if there is an early game the next morning. Drink high-carbohydrate drinks with meals in recovery and the following morning.

If games finish as late as 9pm or later, many players lose their appetite. A liquid sports meal (Complan, Sustagen) or smoothie would be useful at this time. Instant noodles, soup and toast and fresh fruit are also suitable along with added fluids.

Catering at tournaments

In a self-serve situation, offer the carbohydrate-rich foods first in the line up (e.g. rice, potatoes, pasta and starchy vegetables), and offer the meat dishes at the end. This sequence encourages larger serves of carbohydrate, and smaller serves of protein, hence improving the balance.

Ensure a wide variety of breads and rolls are served at each mealtime and position in strategic places. For example, put baskets of crusty bread rolls next to soup, and have a wide selection of bakery products including muffins, crumpets, pita bread and bagels.

Maximise the carbohydrate content of meals by adding legumes to casseroles and soups, thick layers of pasta to lasagne, noodles to salads and soups, and use thick pizza bases if making pizza.

Provide a supply of low-fat snacks including sandwiches, fruits, yoghurts, cereals and cereal bars for in-between meals.

Encourage athletes to take their own supply of ready-to-eat recovery foods and drinks to the turf.

Where to go for more information:

Books

Eat to Compete

J. Pearce 1999 (Reed Publishing)

The Complete Guide to Food for Sports Performance

L. Burke 1995 (Allen and Unwin)

Sport Nutrition for New Zealand Athletes and Coaches

M. Howe, I Hellemans, N. Rehrer, J. Pearce 2002 (Reed Publishing)

Websites

Australian Institute for Sport www.ais.org.au/nutrition

Sport Science New Zealand www.sportscience.org.nz

Cookbooks and Recipe Websites

Eat to Compete Cookbook

J. Pearce 2000 (Reed Publishing)

Quick Food for the Heart

G. Gourley 1999 (National Heart Foundation)

Survival for the Fittest

L. Burke et. al 1999 (Australian Institute of Sport)

Survival from the Fittest

L. Burke et. al 2001 (Australian Institute of Sport)

www.nestle.co.nz

www.nzbeeflamb.co.nz