

Energy management for the Hawkesbury Classic

The whole purpose of having a good nutrition plan for the Hawkesbury is to ensure that you have sufficient energy to complete the event in the time you want to complete it in.

Energy available for the event is limited by the amount of energy you have stored in your body before the event and how much energy you can take in during (your nutrition plan). This means you have a limited supply of energy from which to draw during the event, so in order to finish with the performance you want means that you need to manage your energy usage as well as your nutritional intake.

A Quick Energy Overview

Energy is supplied to the body by a number of different processes that supply energy at different rates in order to cater for activity ranging from intense and immediate activity to long duration low intensity activity. The energy is supplied by different biochemical reactions that take different time rates to deliver. Hence fast intense action (e.g. Sprinting) can be catered for by the rapid reactions of some systems and the slower reactions of other systems are able to provide for the lower levels of endurance activities (e.g. Marathons). Similarly the speed of the reaction is also related to the amount of energy that can be supplied over time. Fast supplies of energy run out of fuel faster than the slower ones and are less fuel efficient

Activity is started by energy supplied by what is called the a-lactic anaerobic energy system. This is a short term supply using a specific type of fuel kept in the muscle and is intended to very quickly supply energy for immediate and rapid action. Enough of this energy is stored for about 10 seconds of activity which is sufficient time to allow the next fastest reaction – the glycolytic anaerobic (or commonly the lactic) system - to get up to speed and start supplying energy. The lactic system can provide energy for intense activity for about 30-40 seconds before waste products from the reaction start to cause fatigue and interfere with the action of the muscles.

The next system in line, which is getting going whilst the lactic system is supplying energy, the Aerobic system, actually uses the by-products of the lactic system as fuel to further produce energy for the muscles to use. If the activity level is too high then there is a build up of lactic by-products which produce lactic acid, one of the contributors of fatigue. There is a level of activity where the amount of by-product produced by the lactic system is balanced by that used by the aerobic system so that the level of lactic acid in the blood reaches a certain level and stays there. If activity increases, the level of lactic acid in the blood increases resulting in a build up of fatigue. This is called the lactic threshold. The optimal endurance/ speed effort is at this level of activity, though this is still too fast for marathon events of more than 2 to 3 Hours.

Both the glycolytic lactic and the aerobic system use the same base fuel – your carbohydrate supply, however the aerobic system produces about 20 times the amount of energy per unit of carbohydrate than the lactic system, though at a much slower rate.

Hence the importance in minimising use of the lactic system during endurance events (e.g. Fast starts)

Whilst these systems are getting fired up, the body is also tooling up to use fat to produce energy. The fat to energy reaction is in turn slower than the aerobic system, but can provide much more energy. A slower reaction again is the use of protein as fuel which can be provided by burning muscle, not an ideal thing, but it will happen. Also when muscle is broken down compounds are produced which cause the brain to register fatigue, again a thing to be avoided. If protein is present in the blood from dietary intake it is used in preference to breaking down muscle and the fatigue chemicals are not produced.

The sequence above is for where a maximum effort is taking place. If the effort is sub maximal, that is requires a slower energy delivery, then we get overlapping of the energy systems so that, depending on the intensity of activity, total energy can be supplied by some or all of the systems overlapping and providing energy at the same time from different fuel sources.

For moderate activity this can mean that the energy is supplied by the lactic and aerobic systems using carbohydrate and the fat burning systems. This information we can use for the Hawkesbury.

How to use the energy systems behaviour to manage our energy use in the Hawkesbury:-

On average, energy is used during the Hawkesbury at the rate of 550-700 Cal / Hour or about 6000 to 7000 Cal for the event, depending on how hard you push and how long you take.

When fresh, the average person has about 2000 Cal of carbohydrate stores in the body, with carbohydrate loading and pre-event feeding, this can be taken up to between 2400-2800 Cal. Under activity such as paddling in the Classic, the body can only absorb about 60 grams of carbohydrate an hour (any more will just sit in your stomach and cause problems) with additional small amounts of energy intake from protein. This means about 240 – 300 Cal can be taken in at best per hour. If these two areas were the only fuel available then we would only have enough to last for about 6 to 8 hours with optimal nutrition intake. However if we used all of our carbohydrate for fuel we would be in trouble as this is the only fuel the brain can use which could explain why some people develop hallucinations about the time they get to Spencer.

As discussed above if we operate at the appropriate level then we can get all fuel systems contributing to our energy supply, and this is the key to our energy management for the classic.

At about 70 to 75% effort, energy supplied by the lactic/aerobic system accounts for about 40-50%, the rest is supplied by the fat burning system and a small – say up to 5% is provided by burning protein. So if we are operating at about say 70% effort and fat is providing 55% of our energy and we are burning 600Cal per hour then 330 Cal is provided

by Fat and 240 Cal is provided by Carbohydrate and about 30 Cal by protein. This means that you would be able to maintain this level of effort for about 10 to 11 hours.

Depending on your paddling efficiency this would be enough for most trained and experienced paddlers to complete the course, If you haven't been able to reach this level of efficiency in training and experience, and need to take longer, then you would also need to drop your speed and hence level of effort to utilise more of your fat stores and hence take more time for the event, hence the benefit of focussing on developing paddling efficiency (i.e Speed for a given effort) during training.

So Summarising:-

Ensure you are fully carbo loaded in the 2 days leading up to the classic with a substantial breakfast and lunch high in low GI carbohydrate on the day of the event.

Ensure your nutrition plan can deliver you about 250-300 cal per hour of which about 10% should be by protein to prevent muscle breakdown.

Limit your exuberance at the start so as not to go to lactic. A burst for about 30 seconds, or about 100 meters is OK as this would not produce too many problems but would get you clear of all the boat wash and maybe get onto a wash ride.

Get to a nice cruising speed as soon as possible at about 70 to 75% effort (some people use heart rate monitors to judge this) and don't get tricked by incoming tide to increase your effort. Plan your trip so you allow for a drop in speed to maintain the same effort against the tide as with the tide. Its better, physiologically, to have allowed to go slower than think you are falling behind schedule, you will make up time when with the tide.

If you need to increase effort for a short period, so that you go beyond the lactic threshold, back off for a while and let your system balance out again.

Ensure you take fluid with your food intake as this will increase the speed that the carbohydrates get into your system.

After the event your system will be deplete of fuel but continue to consume energy for a while after (could be a couple of days). Ensure you resupply yourself with, carbohydrates, proteins and even fats as well as fluids as soon after the event as possible and for the days after to meet this demand and rebuild .

Enjoy the event

Phil Geddes