RECOVERY FROM EXERCISE & SPORT PERFORMANCE — IS THERE A ROLE FOR DAIRY?
Recovery from exercise – What’s going on with muscle refueling and repair?

Performance nutrition is an integral part of any athletes training whether you are competing or a recreational exerciser. Because of the physiological stress of exercise, during recovery from exercise and sports performance, many major restorative processes are activated including recovery of fuel stores, repair of damaged muscle, restoration of fluid and electrolyte balance, lactate oxidation and removal, and inflammatory and anti-inflammatory responses. Consequently after exercise major recovery processes are activated. There are two main recovery processes:

1. Replenishment of muscle fuel stores with carbohydrates (glycogen re-synthesis) – getting this right is important for the next training session and for preparing for competitions.

2. Repair, growth and remodelling of muscle necessary to promote recovery (Muscle Protein Synthesis – MPS).
What you eat is important.
The guiding principles for recovery.

Almost half a century ago, the remarkable ability of muscle to rapidly restore carbohydrate stores during recovery was identified with much of the focus on refueling with carbohydrate. What we now know is that protein too has a role to play in recovery. A significant amount of scientific research is available on what is the best diet (mixture of carbohydrates and proteins) and the right time to eat for recovery.

The best recovery menu is to include sources of carbohydrate and protein at a ratio of 3:1 up to 5:1 in two meals in the first four hours of recovery. Delaying the first meal in the recovery process may delay your recovery and impact on how your body adapts to exercise.

One beverage to consider for recovery is milk. This is because lactose in milk provides a source of carbohydrate for the resynthesis of glycogen whereas the protein provide amino acids for MPS. Milk also provides fluids and electrolytes that are important for rehydrating after sweat loss.

International Society of Sports Nutrition recommends a high glycemic index carbohydrate and fast digesting protein – the perfect recovery blend!
For a short period of time (up to four hours) after exercise, anabolic recovery processes in the body are maximised including glycogen resynthesis and MPS. During this time, the body offers the greatest potential to rapidly start the storage of muscle carbohydrate and recovery and repair of muscle protein. The practical implication is that by providing the body with nutrients as soon as possible after exercise, activation of a variety of recovery processes are optimised.
Composition of milk and processing to hydrolysates.

Whole milk comprises approximately 13% ‘solids’ with approximately 27% of that solid being protein. Whey protein accounts for 20% of the total protein content, with casein protein accounting for the remaining 80%. In simple terms, whey is known for being fast-digesting and having rapid AA appearance in blood, whereas casein is known for being slower-digesting and having delayed AA appearance in blood. Hydrolysates are produced by enzymatic pre-digestion or bacterial fermentations of protein, resulting in shorter polypeptide chains that are more rapidly digested and absorbed, often as dipeptides and tripeptides with bioactive potential. When combined with carbohydrate in a recovery drink, these hydrolysates have potent effects on both glycogen resynthesis and MPS through rapid delivery of AAs into the bloodstream, and by eliciting an exaggerated insulin response.
Each snack provides a blend of protein rich in essential and branched chain amino acids, and healthy, nutrient-rich sources of carbohydrate, which would form part of a recovery strategy targeting carbohydrate-protein ratios of 3:1 up to 5:1, and providing 2*25g doses of protein in the first four hours after exercise. The challenge of exercise training as much as doubles the dietary protein requirement for active adults and athletes (ranging from 1.2 to 1.8g per kg body mass per day) compared to the RDA for the general population.
What this research means for...

**Food Industry**
Whether targeting the mass market or elite athletes

Dairy protein has a valuable role in recovery. Hydrolysates or bioactive peptides are a high value added ingredient suitable for inclusion in a range of sport nutrition formulations.

**Health professionals**
When advising elite athletes or active individuals

Providing evidence based advice on the composition and timing of recovery nutrition would be of benefit to all those engaged in sport. Dairy protein contains an ideal balance of essential amino acids that cannot be produced by the body.

**Elite athletes or active individuals**

Replenishment of muscle fuels stores with carbohydrate and protein should be a priority after exercise. Milk, cheese, yogurt or flavoured milks or powdered recovery formulations for adults are an convenient way to obtain the required amount of protein.
What’s next in the dairy and recovery story?

Insulin is a hormone that controls blood glucose levels and it is particularly important in recovery and exercise performance. Researchers in FHI UCD are looking at a dairy based protein ingredient to see if it will improve endurance after recovery. The scientists are currently investigating the ingredient to see if it will improve the insulin response and lead to a greater rate of muscle glycogen synthesis compared to other protein and carbohydrate drinks.

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To read the full DN Forum on dairy and performance nutrition publication click here

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