Lacprodan® HYDRO.365 sets the pace in endurance sports nutrition

A trial has shown that endurance athletes using Arla Foods Ingredients' gold-standard whey protein hydrolysate are able to train harder and perform better, day after day.
ABSTRACT
In the world of endurance sports, many athletes are yet to come to appreciate the benefits of whey protein in helping the body recover after intense exercise.

Arla Foods Ingredients entered into collaboration with Århus University and Team Denmark to investigate the benefits of whey protein to endurance athletes. It demonstrated that Lacprodan® HYDRO.365, a whey protein hydrolysate developed by Arla Foods Ingredients, leads to better performance and faster recovery following intense training compared with mainstream sports drinks1.

Scientific evidence suggests that whey protein hydrolysates are more effective than other proteins commonly used in sports nutrition products because they are absorbed into the body more quickly. This means whey protein hydrolysates are the gold-standard ingredient for sports supplements and are especially well-suited for endurance sports nutrition products.

INTRODUCTION
There has been a big increase in the number of people participating in endurance sports, both at grass roots and elite level, and this has led to growth in demand for sports nutrition products that improve performance and accelerate recovery. According to Euromonitor International, the global endurance sports nutrition segment is currently worth US$20 million and is projected to grow to US$28 million by 2019 – an increase of 36% over the period.

A key element of any endurance athlete’s training schedule is recovery. Endurance training can place great demands on the body because it often takes place on consecutive days or even more than once a day. This can lead to reduced glycogen (ie carbohydrate) stores, potential muscle damage and degradation of muscle proteins2. As a result, optimisation of recovery between training sessions is essential to ensure good muscle health, prevent injuries and maximise performance.

Traditional sports beverages, such as isotonic, hypotonic and hypertonic drinks with carbohydrates and/or electrolytes as the primary ingredients, are generally regarded as the optimal supplements for recovery from endurance training. However, new evidence from a study conducted by Aarhus University challenges this thinking. It proves that a combination of ‘fast’ proteins and traditional sports drinks is in fact the optimal nutrition solution for endurance athletes aiming for quicker muscle recovery and better performance.

FASTER RECOVERY, BETTER PERFORMANCE
It remains the case that many in the endurance sports sector are unaware of the benefits of using protein for muscle recovery, and the market remains dominated by sports drinks based on carbohydrates and/or electrolytes. However, athletes are always looking for the ‘next big thing’ to help them perform better. This means there is a tremendous opportunity for sports nutrition companies to bring to the market protein-rich products designed especially for endurance enthusiasts. Arla Foods Ingredients has developed Lacprodan® HYDRO.365, a premium-quality whey protein hydrolysate that offers elite athletes superb recovery benefits. It represents a new frontier in sports nutrition and represents a fantastic opportunity to create the next generation of recovery products.

To challenge the widespread belief in the world of endurance sports that traditional sports drinks alone are optimal for recovery from endurance training, a study was carried out involving 18 elite level orienteers from Team DK, the Danish national team. The results demonstrated that the athletes who consumed Lacprodan® HYDRO.365 alone and in combination with traditional sports drinks recovered more quickly and performed significantly better than those who consumed traditional sports drinks alone.
The 18 athletes took part in a one-week training camp. They trained twice a day, every day (apart from on one rest morning) equating to 13 training sessions during the course of the week. They were divided into two groups of nine. One group received a sports drink containing carbohydrates and electrolytes before and after each training session; the other group received pure HYDRO.365 before each session and a blend of HYDRO.365 and the sports drink afterwards.

The results demonstrated that the athletes who consumed HYDRO.365 before and after training performed better in a final 4km run-test (with 20 control points) than the sports drink-only group (see Figure 1). The HYDRO.365 group demonstrated a mean improvement of 17 seconds for the 4km time trial, while the sports drink group saw no change over the week (Figure 1). The run-test was undertaken initially before the camp and then again following the conclusion of all 13 of the training sessions held over the course of the week, making it possible to test the impact of the HYDRO.365 supplementation during the training camp.

The HYDRO.365 group also experienced less muscle damage compared with the sports drink-only group (see Figure 2).

Figure 1. Performance in 4km run-test, with 20 control points, at baseline and at Day 7. Data are shown as mean±SEM. *p<0.05: Improvement in performance in PRO-CHO at Day 7 compared to baseline. # p<0.05: Interaction between time and treatment. PRO-CHO: protein(HYDRO.365)-carbohydrate group. CHO: carbohydrate-only group.

Figure 2. Plasma creatine kinase (CK) levels from morning samples on days 1, 3, 5, 6 and 7, then after the 0 and 1hr after the last training session. (Creatine kinase is used as marker for muscle damage) Significant interaction between time and treatment was observed for CK (p<0.01).
RAPID ABSORPTION

HYDRO.365 has a particularly high degree of hydrolysis, which may help explain the enhanced recovery the elite athletes experienced in the study. It means HYDRO.365 is more easily absorbed than intact whey proteins because it has already been broken down, or ‘pre-digested’, into amino acids and smaller short-chain peptides. Studies have shown that hydrolysates are more rapidly absorbed than the intact proteins normally found in food\textsuperscript{3,4,5}. Their ‘pre-digested’ state means they are absorbed directly and quickly into the blood. The rapid absorption promotes much faster recovery after a workout in comparison with intact proteins, due to the following factors\textsuperscript{6,7}.

1. Faster absorption of peptides and amino acids

This is particularly important during endurance exercise because the body has a limited capacity to digest and absorb intact protein and long-chain peptides (those with more than four amino acids)\textsuperscript{8}. Since hydrolysates are pre-digested, they are more easily absorbed by the gut, which produces a more rapid spike in the levels of amino acids in blood plasma compared with other sources of protein\textsuperscript{7}.

Furthermore, whey protein hydrolysates such as HYDRO.365 are rich in short-chain di- and tri-peptides, which are more rapidly absorbed into the body than long-chain peptides. This may increase the amount of amino acids available to the active skeletal muscle tissue, resulting in improved muscle recovery. In addition, protein loss is reduced after ingestion of di- and tri-peptides compared with long-chain peptides or intact proteins\textsuperscript{9}.

![Figure 3. Plasma branched-chain amino acids concentration is higher and increases faster with whey protein hydrolysate than a standard whey protein](image)

**Figure 3.** Plasma branched-chain amino acids concentration is higher and increases faster with whey protein hydrolysate than a standard whey protein\textsuperscript{5}

2. Superior glycogen replenishment

Glycogen is the body’s carbohydrate store and is the primary fuel used during endurance exercise. Training and competition leads to reduced and depleted stores, so it is important that these stores are replenished for subsequent sessions\textsuperscript{10}.
3. **Advanced insulinotrophic effect**

Whey protein hydrolysates are insulinotrophic. This means that consuming a dose of HYDRO.365 combined with easily absorbed carbohydrates straight after a training session will maximise recovery benefits by inducing a high concentration of insulin in an athlete’s blood plasma\(^1\).

Insulin is one of the body’s most powerful muscle-building hormones. Ingesting a combination of HYDRO.365 and carbohydrate after exercise induces plasma insulin concentration and therefore conditions the body’s environment for superior glycogen replenishment. As such, consuming a dose of HYDRO.365 combined with easily absorbed carbohydrates, in a traditional sports drink for example, before and straight after a training session will accelerate recovery.

**A NEW GENERATION OF PROTEINS FOR SPORTS NUTRITION**

Protein is already widely used by many athletes, alongside other helpful nutrients to help build muscle and speed up recovery after a hard training session\(^2\). However, significant number of endurance athletes are yet to discover the benefits of protein and this opportunity remains largely an untapped market.

The form in which proteins are delivered has evolved over time — from standard whey, to isolates, and finally to whey protein fractions. Each new generation of ingredient has made it possible to pack a more powerful protein punch in a convenient sports nutrition package, such as a beverage, gel or bar.

Now, whey protein hydrolysates are emerging as the next big innovation in proteins and are poised to join other forms of protein in the mainstream sports nutrition market. Whey is already the gold standard in proteins for sports nutrition, thanks to its ideal essential amino acid profile and high proportion of branched-chain amino acids. As a whey protein hydrolysate, HYDRO.365 builds on whey protein’s unrivalled reputation for performance by making the protein even easier to absorb, so recovery can begin sooner.

Formulating sports recovery products with HYDRO.365 for endurance athletes will enable manufacturers to offer superior products for improved recovery and performance after high load intensive exercise. With elite athletes on the lookout for anything that will help them maintain their edge, a nutritional product that promises to help them train hard every day is a compelling offer.
APPLICATIONS FOR LACPRODAN® HYDRO.365

HYDRO.365 can be incorporated into a wide range of sports nutrition supplements that will appeal to endurance athletes everywhere. It is UHT-stable and pH-flexible, enabling its use in all forms of beverage. Its low bitterness profile makes it especially attractive to manufacturers wishing to develop highly functional clear sports recovery beverages with a palatable taste, both with pasteurisation and UHT treatments. The ingredient can also be successfully incorporated into sports gels, protein bars (up to 50% protein), powder blends and tablets. This application flexibility means HYDRO.365 is the perfect ingredient solution for sports nutrition products designed for both elite endurance athletes and amateurs who take their endurance training seriously.

Arla Foods Ingredients recommends that a dose of between 20g and 50g of HYDRO.365 is consumed before and within two hours of finishing a training session in order to maximise the benefits.

LACPRODAN® HYDRO.365 AT A GLANCE

• 26.7g of essential amino acids per 100g of protein
• 21.7g of branched-chain amino acids per 100g of protein
• Excellent amino acid profile
• Highly digestible and soluble
• UHT stable
• pH flexible
• Low bitterness profile
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