EQUINE GUELPH Research Update

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Welcome to Equine Guelph's digital newsletter

Can Spirulina Help Horses Recover Faster from Intense Exercise?

Elevating performance and seeking the competitive edge is what makes equine supplements a billion-dollar industry, but what makes the difference between a supplement that creates expensive urine and a nutritional supplement that could actually have an impact?

Associate professor at the University of Guelph, Wendy Pearson and Ph.D. candidate Dr. Nadia Golestani, answer this question and more in their quest to develop quality nutraceuticals with positive equine health benefits. Their latest study on Spirulina reveals potential for expediating recovery after intense exercise. It also holds promise supporting joint health and optimizing performance through enhancing oxygen delivery in the bloodstream.

Look at the Label and Beyond the Label

"Buying a quality product requires looking beyond the label," says Pearson. *"There are so many products on the market today that it is virtually impossible for even somebody like me, who spends my life looking at nutraceuticals, to look at a label of one product and tell the difference between that and the product on the shelf right next to it."*

Looking for third party quality assurance can be one indicator on the label that the product has some validity. Examples include: ISO 22000, HACCP, CCP, NASC, GMP Certification and UFAS. BETA NOPS will also be particularly important for competitive horses. It ensures that the supplements are free from substances that are banned in equine sports.

Most importantly, Pearson implores horse owners to find out if the manufacturer has invested in research on the particular product they are marketing. *"Lots of companies will talk about the fact that they're science based, but if you peel off a layer or two, you find that in fact the science they're talking about is science other researchers have done on ingredients that show up on the label on their product."*

"The research is expensive," says Pearson. *"We are lucky to have funding from Equine Guelph for our latest study on Spirulina. If consumers prioritized purchasing products with research behind them, manufacturers that are not yet doing research on their products would have an economic reason to do so."*

Pearson recommends consulting your veterinarian before adding supplements to your horse's diet and to always buy from a company that conducts research on their products and doesn't just claim to be 'science-based'.

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Future Research

Spirulina research study cont'

Why Spirulina?

After becoming a DVM, Dr. Nadia Golestani began to pursue her goal of becoming an animal nutritionist, enrolling in the University of Guelph's Master of Animal Biosciences program under the supervision of Dr. Wendy Pearson.

After attending Pearson's lectures on exercise physiology Golestani developed a good understanding of the controversy surrounding antioxidants and the lack of research as to whether they were good for exercise performance or not. For her Master's, Golestani examined inflammatory response of cartilage during exposure to nutraceuticals that could potentially have a role in equine joint care.

Golestani had her eyes opened to the potential of Spirulina after reading a book named 'Spirulina World Food.' It was a gift from accomplished medicinal chemistry consultant, Ralph Robinson, which accompanied an award for Golestani's research in equine nutrition and physiology.

Golestani wanted to explore ways Spirulina could be used in exercise physiology. Her Ph.D. research, under Pearson, set out to study the effects of Spirulina as an antioxidant and how it could potentially modulate inflammation after high-intensity exercise in horses. It was made possible thanks to the support of Robinson, owner of Selected Bioproducts (Herbs for Horses) Inc., and funding from Equine Guelph.

What is Spirulina?

The blue-green algae is gaining popularity not just in human athletes but in equine ones as well. The nutritional profile contains C-phycocyanin and Beta carotene and 60 – 70% amino acids. It has vitamin B, iron, vitamin E and essential fatty acids, particularly gamma-linolenic acid (GLA) plus many more vitamins, proteins and minerals.

Golestani's study focused on C-phycocyanin and Beta carotene in Spirulina with their potential antioxidant effects.

EVENTS

Mark your calendar

Equine Guelph 12-week online courses
Summer Semester May 12
Fall Semester September 15

TheHorsePortal.ca short online courses:

Gut Health & Ulcer/Colic Prevention
Feb 10 - 21, 2025

Horse Behaviour & Safety (adult offering)
Feb 24 - Mar 7, 2025

Introduction to Forage
Mar 10 - 21, 2025

Sickness Prevention in Horses
Mar 31 - Apr 7

Equine First Aid
Apr 7 - 14, 2025

Introduction to Body Condition Scoring – On Demand

Business 101 – On Demand

Horse Behaviour & Safety for Youth – On Demand

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New data shows antioxidants can be a double-edged sword with the capability of reducing inflammation as this may actually interfere with natural tissue adaptation after the rigors of exercise. Golestani's study is looking for the best applications for Spirulina to optimize equine performance without interfering in the natural tissue adaptation process.

Enhancing Recovery Without Interfering with Transient Inflammation

Some inflammation is normal after exercise and protect structures as they recover from the workout. Only when inflammation becomes excessive, does it become a concern in disrupting recovery.

"Transient inflammation is good and needed for recovery. Inflammation challenges the tissue, and the tissue responds by becoming stronger," says Pearson. "What isn't good is chronic, sustained inflammation. We want to see if we can do something about the way tissue responds to an exercise bout without interfering with transient inflammation."

Golestani explains, when a horse undergoes exercise, their ATP (adenosine triphosphate) producing mitochondria are working hard. One of the natural biproducts is Reactive Oxygen Species (ROS are highly reactive molecules containing oxygen), which is good unless they are produced in excess leading to oxidative stress. When there is an imbalance between the production of ROS and the body's ability to detoxify them with antioxidants this is when chronic oxidative stress can trigger vicious cycles of inflammation. Oxidative stress can also lead to cell death and therefore disfunction and disease. Maintaining balance between ROS production and antioxidant defenses is essential for cellular health.

Golestani sums up, *"Strenuous exercise, especially when it is high impact, is going to stress the horse's joints and increase oxidative stress. Imbalance can damage the cells, proteins, lipids in the joint tissue and may lead to early onset of arthritis."*

Pearson adds, *"Moderate intensity exercise is very good for protecting cartilage structure, but when you have repeated bouts of strenuous or very high intensity exercise it can tip the scales to more breakdown of cartilage than you have time to resynthesize. Tissue breakdown occurs when synthesis can't keep up, that's when you start to see declining structural integrity of the tissue."*

'What is adequate recovery time' becomes the million-dollar question with no definitive answer given a multitude of variables including the starting fitness level, type of activity, intensity of work, and other factors specific to each horse as an individual. This is where talented horse trainers excel. They can pick up on a change of behaviour in the horse in a workout even before physical signs of stress and adjust the training program accordingly.

You Bet Your Biomarkers

Golestani's researched the antioxidant effects of Spirulina, by looking at biomarkers associated with inflammation. In her study, biomarkers were measured before and after exercising horses that were given a Spirulina supplement against those who were not.

Results showed that exercise caused a temporary increase in nitric oxide (NO), a marker of oxidative stress, shortly after activity. This rise was discovered in both blood plasma and the synovial fluid. Horses given Spirulina had lower NO levels during recovery, indicating better management of oxidative stress. In joint fluid, NO levels increased 24 hours after exercise but were better controlled in the Spirulina group, with lower levels observed later in recovery. This signifies not only the potential for quick recovery from exercise but also properties that could promote joint health.

Another inflammation marker, prostaglandin E2 (PGE2), was also measured. PGE2 levels in the blood peaked eight hours after exercise and were higher in horses that received Spirulina, suggesting a stronger initial response to exercise. In joint fluid, Spirulina-supplemented horses showed lower PGE2 levels early in recovery, which may help reduce inflammation in joints over time and lower chances of early onset of arthritis.

A key finding was Spirulina boosted levels of Resolvin D1 (RvD1). "RvD1 is so important in resolving the inflammation and promoting the clearance of inflammatory cells and for the tissue repair," said Goestani. RvD1 is a bio active lipid mediator derived from omega-3 fatty acid. Horses receiving Spirulina had consistently higher RvD1 levels in their blood and joint fluid during after exercise.
The rise in the RvD1 biomarker highlights how Spirulina has the potential to enhance this natural resolution pathway and its potential to protect against inflammation, speed up recovery and promote cartilage protection.

Pearson echoed the dramatic increase in Resolvin D1 in the horse's receiving Spirulina to be pretty strong evidence that it could protect horses from bouts of transient inflammation from becoming chronic and contribute to faster recovery after exercise.

Horses fed Spirulina in the study also had higher hematocrit levels, which means their blood could carry more oxygen, translating into potentially enhanced performance. They also maintained higher glucose levels during recovery, providing more energy. Eight hours after exercise the control group had a drop in glucose, but the group fed Spirulina did not. Retaining glucose stores post-exercise is especially helpful for performance horses that need sustained energy and endurance during training or competition.

Importantly, there were no negative effects on cartilage biomarkers, further suggesting Spirulina may also promote joint health during recovery.

Top 3 Practical Take-aways for Horse Owners:

Enhanced Oxygen Delivery and Energy Boost: Spirulina helped improve oxygen delivery and energy reserves in horses.

Support for Joint Health: Spirulina supplementation reduced markers of oxidative stress and enhanced inflammation resolution without damaging joint cartilage. This suggests Spirulina may protect against wear-and-tear on joints, helping reduce the risk of arthritis and supporting long-term joint health in active horses.

Faster Recovery After Exercise: Horses given Spirulina recovered more effectively after intense exercise, as seen by enhancing the production of pro-resolving molecules like Resolvin D1 (RvD1). This makes Spirulina a practical addition to the diet of horses involved in regular training or high-intensity work.

These findings highlight Spirulina's potential as a safe and natural dietary supplement for managing inflammation, protecting joint health, and supporting recovery in equine athletes. Further research is needed to confirm long-term benefits, but this current study provides evidence that Spirulina offers a promising tool for promoting health and performance in horses.

Read the full article including: third party quality assurance indicators, and the rise in popularity of nutraceuticals plus precautions at:
https://thehorseportal.ca/?p=66020

-story by Jackie Bellamy-Zions

Thank You for Supporting Research

Over 135 equine research projects have been funded since 2004 and Equine Guelph would like to extend sincere thanks to our supporters in the racing industry and donors like you who have made it all possible.

Read the lay summaries for past and present Equine Guelph funded research studies at EquineGuelph.ca

2024 Research Recap

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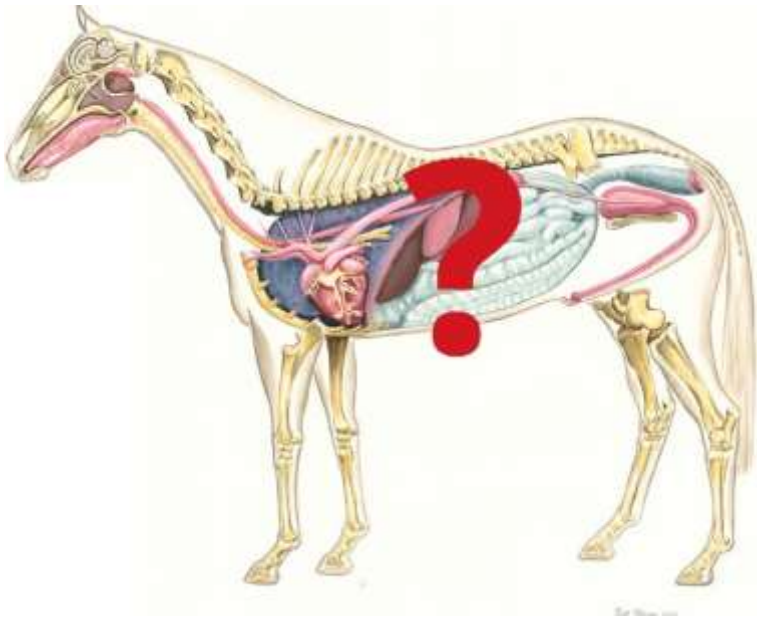
- What if My Mare Did Not Get Pregnant?
- Stepping Out of the Dark with a Study on Blindfolding Horses
- Researching Biomarkers to Understand Joint Health
- Study Examines Selenium Blood Concentration in ON Broodmares & Foals
- Testing 1-2-3 Strangles Research
- Researching Infertility in Mares due to Endometritis
- Electroarthrography to Predict Cartilage Quality



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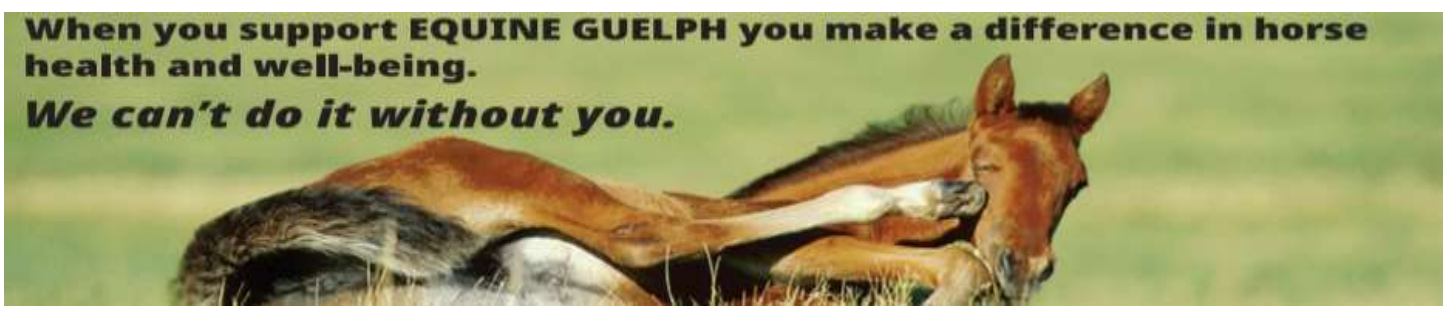

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