

# Ask the Nutritionist

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*Ask the Nutritionist is a new monthly column featuring questions answered by PhD equine nutritionists and sponsored by Purina Animal Nutrition.*

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## What is the difference between nutritionally managing horses with PSSM1 (Type 1 Polysaccharide Storage Myopathy) vs. PSSM2 (Type 2 Polysaccharide Storage Myopathy)?

PSSM1 and PSSM2 are different disorders with slightly different recommendations for nutritional management.

Horses with PSSM1 are more sensitive to dietary starch and sugar levels, because they accumulate more muscle glycogen than normal horses or horses with PSSM2. PSSM1 horses also benefit from more calories supplied by dietary fat because they possess the GYS1 mutation and store an amylase-resistant polysaccharide which can't be used as substrate for working muscle fibers. Training adaptation and a diet consisting of higher dietary fat can shift certain muscle fibers to rely more on fatty acids, and less on glycogen, to fuel exercise.

Diets for horses with PSSM1 should be low in starch and sugar (nonstructural carbohydrates – NSC) and supply more calories from vegetable oils. “Easy keepers” or less active PSSM1 horses may not be able to consume higher fat levels without becoming overweight. In these cases, use forages low in starch and sugar (<12% NSC) and a ration balancer, like Purina® Enrich Plus® horse feed, to meet nutrient requirements. Specific dietary NSC and fat levels that best manage each case will vary by horse and total calorie demand.

Horses with PSSM2 have abnormal muscle histology with glycogen aggregation, but do not possess the GYS1 mutation, accumulate excess glycogen or store an abnormal polysaccharide. Dietary recommendations for

Differences in  
**PSSM1 vs. PSSM2**  
horses

Similarities between PSSM1 and PSSM2 horses

General diet recommendations:

- Reduce calories from starch and sugar
- Increase calories from fats when possible
- Adjust levels case-by-case

Regular exercise is as important as diet for better management

PSSM2 are not as well defined, but PSSM2 horses don't seem to be as sensitive to dietary starch and sugar levels as PSSM1 horses.

Current recommendations for PSSM2 cases call for the use of low- to moderate-NSC feeds and fat supplementation based on the horse's energy needs. Research suggests that amino acid supplementation, using whey protein-based supplements like Purina® SuperSport® Amino Acid Supplement, can be helpful in optimizing muscle recovery following exercise.<sup>1</sup> These supplements may also be helpful when managing symptoms in horses with PSSM2.<sup>2</sup>

There is no one-size-fits-all diet for horses with PSSM1 or PSSM2. Finding the levels of soluble carbohydrates, fat and other supportive nutrients such as amino acids that best manage PSSM symptoms for an individual horse may require some trial and error. It's important to note regular exercise is at least as important as diet in managing horses with PSSM1 or PSSM2.

1. Vineyard, K.R., M.E. Gordon, P. Graham-Thiers, and M. Jerina. 2013. Effects of daily administration of an amino acid-based supplement on muscle and exercise metabolism in working horses. *Journal of Equine Veterinary Science*, Vol 33(5).

2. Williams ZJ, Bertels M, Valberg SJ. 2018. Muscle glycogen concentrations and response to diet and exercise regimes in Warmblood horses with type 2 Polysaccharide Storage Myopathy. *PLoS ONE* 13(9): e0203467.



### ABOUT THE AUTHOR

Dr. Karen Davison is the Director of Equine Technical Solutions at Purina Animal Nutrition. She earned her Master of Science and Ph.D. degrees in Equine Nutrition from Texas A&M University. Dr. Davison's research has included the use of added fat in horse diets and the effects of higher fat diets on reproduction and lactation in broodmares and on development of weanling horses. Dr. Davison has guest-lectured at universities and veterinary schools, contributed to scientific research journals and magazines, authored book chapters and presented at regional and national veterinary meetings.