Horse Insulin Resistance Diet

The key is to control carbohydrate metabolism by eating the right foods in the proper amounts. The HEIRO program will greatly assist your horse in this project by helping to manage insulin.

Your horse ideally will get some fresh grass, some hay, some grain, and some snacks. Often the scenario is that the horse gets too much of one item and it triggers Laminitis.

We will go over several items such as grass management, hay to feed, fats/oils, grain, good and bad snacks, and hay testing.

In the past, (2006, 2005…) you would see the term NSC standing for non-structural carbohydrates. This term is still used by feed companies to categorize low carbohydrate feeds of about 10-15% NSC. When you test your hay or fresh grass you will not see this NSC listed anymore due to recent changes in the way sugars are categorized. The new category for sugar content of hay/fresh grass is called ESC because it contains sugars and a partial amount of fructans.

The starch category is the same as always.

This new category cannot be compared to your past analysis. Know that NSC is not ESC and that past sugar tests cannot compare to ESC.

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Hay

Goal: slow, sustained release of nutrients all day long with no long periods of fasting.

1. Hay is essential in helping prevent Laminitis. Your horse cannot be on grass all day and cannot get grass in the winter/bas weather. Hay provides fiber to steady Glucose levels. Hay provides eating activity for your horse (they eat 70-80% of the day). Hay decreases stress which can steady stress hormones. Hay stimulates the gut tone and motility. Steady hay eating avoids a problem. If the horse has fasted several hours and then is fed, they can get an Insulin surge beyond the normal which can be harmful. We want a slow, constant, low level of hay moving through.

2. Spread the hay. Make horses walk to multiple small piles in the field to increase exercise.

3. Soaking hay. This can lower Carbohydrate levels and as a bonus has been shown to decrease allergens in “heave” horse reactions. At times this is not practical in cold weather – you get a “haysicle” in the bucket (the water freezes into ice). The fall is a great time to test hay while you are sticking up to feed it in the winter. If it has a low ESC/sugar/starch content you will not need to soak it. Also, test your horse’s insulin level after a few days on the new hay. This will let you know if all is OK. Most Laminitis is via fresh grass and not hay. Pasture associated Laminitis accounts for 54% of Equine Laminitis.

4. What hay to feed and what levels do I look for if tested?

   a. **Timothy Grass Hay**: Good choice, easy to get. If tested, want 8-12% protein, low end of normal range of ESC (Simple Sugars) that is 4.7 – 10.9%, and low end of normal range of starch that is 1.5 – 4%.

   b. **Alfalfa Hay**: Can mix with Timothy up to a 50:50 ratio. It has a slightly lower ESC, starch, and sugar content than Timothy Hay. The Equi-Analytical website has a printout showing its safety. If someone tells you Alfalfa is a problem in Insulin Resistant horses, they do not have the facts. ESC is 4.2-8.2%, starch is 0.8-3.2%. I usually will not go above a 50:50 ratio because higher amounts of Alfalfa seems to cause more gas and runny manure.

   c. **Orchard Grass Hay**: Very similar to Timothy grass Hay. A good choice.

   d. **Teff Grass**: Tests we have run show it to safe on sugar and starch, so it is a good choice. When you test, you want similar values as Timothy. Can have mixes of Teff with Orchard or Timothy.
e. **Bermuda Hay**: A grass hay. There are 2 types of horse hays from this variety that are mainly grown in the South (Florida, Texas…) due to hardy in a variety of weather.
   i. Coastal Bermuda Hay
   ii. Tifton 85 Bermuda Hay

These hays are usually “stand alone” – not blended with other hays like Timothy or Alfalfa. They are unique in that they have more dry matter and cure faster than any other hay types.

Avoid wheat hay, oat hay, barley hay – all are very bad and high in starch

5. Your horse, if not getting any fresh grass, will need 2% of body weight in hay daily. In most Insulin Resistant horses, we want to reduce weight, so we will feed less hay. A normal 1,000-lb horse needs 20 lbs of hay. To assist your horse in weight loss, instead of feeding the normal horse 2%, feed 1.8% or 18 lbs of hay. To slow their eating there are ways for putting in a field alone, and blocking their view if in a stall. Another way is to put the hay in a hay net. The net will slow their ability to get big mouthfuls of hay. At times, a horse may still go through his hay too fast even with a hay net and get stressed then Insulin surges due to fasting. Put one net into another net. This is your Plan B, because it will really slow down the rate of eating. Perhaps try a double net in the night and a single during the day. To weigh hay, get out the bathroom scale and weigh the bale.

6. Avoid feeding Blue Seal’s Hay Stretcher – it has molasses and a NSC of 22%

7. Often the horse grazes during the day and is in at night. They eat the hay given to them between the 6:00 PM feeding and 9:00PM, the horse is out of food, and goes with no food for 10 hours until the 7:00 AM feeding. When they are re-fed, the get a huge Insulin surge than can be 700% higher than normal. Essentially, the horse is being given a high-dose shot of Insulin every morning. No wonder they put on lots of fat and get laminitic. The fresh grass intake is monitored but it’s the “in the stall with hay that doesn’t last” scenario that can be the real health dropper. Ten pounds of hay that they eat throughout the night will cause less weight gain and protect the feet better than feeding five pounds of hay with almost half a day (or night) with no food.
Fat and Oil Supplements

Do not use these in Insulin Resistant horses. A study by the University of Kentucky’s Dept. of Veterinary Science in 2002 by Dr. Fitzgerald showed that an infusion of fat actually induced Insulin Resistance in horses in less than 2 hours’ time. This can lead to a Laminitis trigger. High fat diets can cause a crisis.

High insulin levels already are promoting fat which in turn release toxins to further cause more insulin. This cycle is not helped by promoting more fat with a high fat diet.

What to avoid:

1. No added oils in horse insulin resistance – No corn oil. No rice bran oil.
2. No rice bran in horse insulin resistance – three big reasons
   a. According to a USDA study by Dr. Marshal in his 1994 Rice Science Study, it is approximately 16% fat. This is going to promote fat on your horse, add weight, and cause problems.
   b. Rice bran is loaded with starch. Dr. Marshal has it at 16% and Equi-Analytical Labs at almost 20% average. This is 5-7 times higher than Timothy/Orchard hay or beet pulp. Rice bran has an NSC level of about 25 which is extremely high
   c. Rice bran’s NSC is very close to that of Wheat bran (30). Both need to be strongly avoided in these horses.

High fat makes insulin go up 25 times! Study: Journ. Vet Sci., Dr. Schmidt, 2011. Shetland ponies fed a high fat-enriched diet led to a 25 fold increase of plasma insulin levels after only being on it for 2.5 months.

On the bag of ingredients of many low carbo, low fat feeds you may see rice bran; don’t panic. They put in an extremely small amount for flavor. These products have low NSC values (10%) and low fat values (3-5%). The main point is not to add more of rice bran or wheat bran to the diet.

Grain (Ration Balancer)

Yes, you will feed grain to an overweight Insulin Resistant horse. Why?

1. An all-hay diet will lead to problems due to vitamin/micro nutrient deficiency. If you hear that the solution to Laminitis in an Insulin Resistant horse is feeding it just hay and keeping it on a dirt lot, you are getting inadequate and incorrect information.
In the winter, grass options are lost, so grain is even more important at this time.

2. What type of feed should I use for my Insulin Resistant horse?

You want a low NSC pellet feed which will provide vitamins/micro nutrients and a high amount of protein. These special feeds are very concentrated so you will only feed a small amount to your horse each day. Normal horses can get up to 1% of their body weight in grains day for maintenance – that is 10-lbs of grain for a 1,000-lb horse. With a low NSC concentrated feed, that same horse gets only 1-lb a day. You will mix the HEIRO in with the morning feed. With Insulin Resistant horses, we want to reduce weight, so we will feed grain and HEIRO only once a day in the morning – your horse’s natural circadian rhythms has Insulin highest in the morning and we want HEIRO working then to control Insulin all day.

There are many low NSC/low carb pellet feeds on the market but they are not all good for an Insulin Resistant horse because they may also have high fat. We want a low carbohydrate (low NSC), high protein, and low fat diet. To compare, sweet feeds have a NSC of 40% due to the sugars/starch of lots of corn, oats, and molasses and some feeds have 12-30% fat.

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<tr>
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<th>Protein %</th>
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* Avoid Essential K GC Plus which contains Glucosamine

** Avoid Gro’n Win GC which contains Glucosamine

### Which Low Carbo Feeds to Avoid?

Ones with extra fat such as Purina Ultium, Ker Re-Leve, and Blue Seal Carb-Guard. These are great options in tie-up, PSSM, and Cushings horses with no Insulin Resistance. Summary: not all “lite” feeds are best for Insulin Resistant horses. You will feed a very small amount of one of these four in the morning alone with HEIRO, beet pulp, and a handful of alfalfa pellets.

### My Horse Is a Hard Keeper

Always too thin, especially in the winter. How to add weight safely using a ration balancer and senior feed.

1. You will combine a ration balancer and a senior feed to bring back muscle and topline
2. Ration balancers have higher protein to help add muscle
3. Both ration balancers and commercial senior feeds are low carb. We need that due to many are Insulin Resistant and are also COPD. This plan will also help breathing muscles that are damaged in COPD.

### Ways to Help Us Monitor the Right Food Needed

There are 2 methods to choose the right foods and to monitor what is in the food. The best way is to use both systems to plan the diet. The systems to monitor are called the “Glycemic Index” and the “Carbohydrate Level Test”.

1. Glycemic Index of Food. This compares food’s effects after eating to that of a similar amount of pure Glucose. Glucose has a rating of 100 and the closer to 100 (higher the Glycemic Index) the faster that food delivers its Glucose into the bloodstream. We want low Glycemic Index foods to avoid Glucose surges which trigger Insulin surges.
2. Carbohydrate Level Test. When you get grass or hay tested to see if it is safe, there are two items to look at to see Carbohydrate levels. They are sugar and
starches.

The main nutrient of hay/grass is Carbohydrate. As we went over earlier, sugar and broken down starch will enter the blood stream as Glucose. We want to avoid high sugar/starch forage or, if we see it, monitor and manage the intake.

Grass will change during the season and if you have a concern, test the grass and test the horse’s Insulin together. If the grass is high in sugar but your turnout time with a muzzle shows a good Insulin level, then all is well. Just because the grass is high in sugar, does not mean you lock the horse in the stall; you just manage the horse differently.

Side not on Fiber: Fiber is also a Carbohydrate but it requires the bacteria of the large intestine to break it down. The sugar/starch Carbohydrates go into the bloodstream at the small intestine. Fiber rolls past the small intestine and goes down the tract.

There are two types of fiber:
1. Soluble fiber – bacteria break it down, nutrients absorbed
2. Insoluble fiber – cellulose seen in stems, seed hulls

Is fiber important?

Yes. It creates a sensation of fullness because it is not digested at the small intestine level, so your horse eats less due to not being as hungry.

It assists in slow, steady delivery of Glucose to the small intestine due to its bulk – slows release out of stomach of sugars.

Soluble fiber can account for 50% of the energy needs of your horse.

Hay and beet pulp have excellent amounts of fiber. Hay has about 30% and beet pulp about 20%. For comparison, corn has only 2% fiber which means it is mainly sugar/starch – that is why corn is avoided in Insulin Resistant horses.
Good Horse Snacks – Low Glycemic Index, Low Carbohydrate

1. Beet Pulp with no molasses added

Beet pulp is a great way to provide fiber to your horse’s diet – added fiber lowers Insulin levels and it gives your horse a feeling of being full which cuts appetite and hence intake. Grass hay and beet pulp have similar fiber.

The sugar part of sugar beets has been mostly removed as it was processed. What is left over is beet pulp which is 97% “sugar free” which is very good. Wet beet pulp is only a 3% ESC simple sugar. Studies have proven that it will not raise Insulin levels and is a good product to feed horses. Do not get beet pulp mixed up with bran mash. Bran ash is extremely high in sugar and cannot be given to these horses/ponies.

Beet pulp has about the same protein level as grass hay (9-10%)

You do not need to buy “designer” beet pulp. It only costs over twice as much as regular beet pulp and that is without added shipping costs on top. Your local feed store has non-molasses beet pulp at about $15.00 per 40-lb bag.

You can feed a 1,000-lb horse beet pulp 1-2 times a day. Soak 2 cups of beet pulp in 4 cups of water for 4 hours.

2. Beet Pulp with molasses

If you prepare beet pulp with molasses you can feed this safely – it actually has less sugar than soaked, plain beet pulp. This is most likely due to our soaking and rising process.

Steps for Preparing Beet Pulp with Molasses:

- 1 cup of beet pulp into a bowl with 4 cups of water. Soak this for 24 hours
- Pour it into a colander and hand pushed it down for 5 seconds to squeeze out water
- Rinse it in cold water for 30 seconds and squeeze it out again for 5 seconds

3. Strawberries, roasted peanuts, whole pumpkin and sunflower seeds, and celery are great snacks

Strawberries are a healthy, delicious snack for your horses.

Roasted peanuts in the shell – high fiber, good protein. Make sure the peanuts are roasted – this means they have been soaked in brine and roasted so they are safe to eat for you and your horse. DO NOT FEED RAW PEANUTS TO HORSES – they may contain aflatoxins if they have not been roasted.
Whole pumpkin seeds and sunflower seeds are high in fiber and easy to give or add to feed.

Many owners tell us their horses love celery sticks – again, high in fiber, low carb, easy to find and cheap

4. **Special Candy for Insulin Resistant Horses**

   In supermarkets they now have special aisles for diabetic foods, this is where you can find this candy. You can also find sugar free candies online.

   Stevita zero calorie candies are tasty and come in many flavors such as grape, strawberry, orange, and cherry flavors

   Why Stevita? In studies it is shown to not cause Insulin surging – it’s also zero calories and has a very sweet taste that horses love.

   **AVOID CANDIES WITH XYLITOL – this artificial sweetener can cause toxic reactions in animals.**

5. **Hay cubes** – why are hay cubes under snacks and not under hay?

   Horses eat cubes 25% faster than hay which means there will be extended periods of fasting with no forage. Fasting causes Insulin to surge way beyond normal when the horse is fed again. This is exactly what we do not want. The goal is a steady release of nutrients all day long.

   Cubes are much more expensive than hay per pound of feed. A 1,000-lb horse will go through a bag in 2-3 days. If you compare that to the cost of the hay, cubes will run about $1,000 more per year per horse.

   Hay cubes are finely chopped so they leave the stomach faster – regular hay slows the process down.

   Hay cubes are a good snack to give in the afternoon. You can slice them up into 4 pieces per cube and give 2-3 cubes. Either alfalfa or timothy cubes are fine to use. One bag will last 3-4 months, that is about $0.12 a day for this snack.

6. **Alfalfa Pellets** – a handful in the morning feed or as an occasional snack is fine. Good fiber, low glycemic index. Again, use this as a snack since using this as the main forage is too expensive (leads to fasting like cubes). Alfalfa pellets have an added bonus of helping to prevent stomach ulcers due to its buffering ability.

7. **Chopped Low NSC Hay** – these are good snacks but are not a primary forage due to three reasons:
a. Studies show that horses eat these too fast. Most horses will blow through 5-10 pounds in less than an hour. If it is the only forage, horses will go 11-15 hours with no food.
b. Finely chopped means it will go out of the stomach quickly, so the horse gets an empty stomach quickly. This is not our goal.
c. These feeds have the advantage of you knowing they are low in sugar/starch, so they are safe to add to the high protein/low carb grain. Add 1 – 2 pounds per feeding. Horses seem eager to eat these products and owners often comment their horses enjoy this forage.

<table>
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<tr>
<th>Names of Feed</th>
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<th>Protein %</th>
<th>Fat %</th>
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<td>Chaffhayne</td>
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</table>

Note: Not all chopped hay is safe for an Insulin Resistant horse – other types add molasses which we don’t want.

8. **Safe Flavorings** – for feeds and to get medicines into your horse.

Most horses enjoy the high protein/low carbohydrate hay ration balancers and HEIRO.

The usual program is to add the HEIRO to your high protein/low carbohydrate hay ration balancer and sprinkle in a little water to let the powder bond to the food. If you add wet beet pulp, this works well when you mix the hay ration balancer and the HEIRO together. Most horses clean the tub.

Some horses are “finicky” or at times need medicines in their feed to help them. Here are suggestions that we have successfully used to get horses to eat and are low carb safe:

a. Sugar-Free Syrup with Stevia
b. Canned pumpkin (not pumpkin pie mix with added sugar) – ½ baking cup = 40 calories
c. Handful of alfalfa pellets (low carb)
d. Cut up 2 alfalfa cubes into 3-4 cookie wafers
e. Add a handful of salted peanuts in the shell
f. Add 4-5 tablespoons of sugar-free applesauce
g. Add 4 sugar-free candies
h. Sprinkle on a small amount of turmeric or garlic powder
i. Handful of sunflower or pumpkin seeds
j. 2-3 tablespoons of Stevia granular powder
You can try one of these at a time or do a couple together to find the combination that works.

9. **Commercial Horse Snacks** – Standlee Apple/Berry Cookie Cubes, made with Timothy plus Alfalfa Hay and a small amount of Cranberry/Apple Juice. Starch only 1.6%, sugar only 7%, low fructans at 5%, 17% Protein, and only 1.5% fat

**Bad Horse Snacks – High Glycemic Index, High Carbohydrates, or Both**

1. **Cookies** – loaded in corn, oats, sugar, and molasses. The cookies at the tack shop need to also be avoided
2. **Candy** – only use special candy (see Good Snacks)
3. **Bran Mash** – lots of Carbohydrates. Higher glycemic index than many grains. Wheat brand and rice bran should be avoided. Rice bran has 8 times more starch than alfalfa cubes and over 10 times more than beet pulp
4. **Certain Grains** – corn, oat, wheat – even a handful is a bad choice
5. **Certain fruits/vegetables** – apples, carrot, applesauce (3 times worse than apples), watermelon
6. **Syrups** – These are 100% carbohydrates, with no protein and no fat, so it is best to use sugar free pancake syrup

   Note: Agave Nectar is also 100% carbs
7. Other items we have seen fed that need to be avoided – jelly beans, yogurt, pretzels, chips, lawn clippings, and frosted mini-wheats

**Flax Seed**

You can feed flax seed to these horses, if prepared the correct way and fed in the right amount.

Flax seed is an excellent source of fiber (40%), a natural antioxidant, high in protein (26%), and high in essential fatty acids – Omega 3 and Omega 6. One tablespoon is only 36 calories.

We are feeding the seed and not pouring cups of flax seed oil into the diet. The fat portion is small if you feed ¼ cup (4 tablespoons) a day to a 1000-lb horse.

According to the Flax Council of Canada (Canada is the largest producer and exporter of flax in the world):

- Brown flax seed has the same nutritional makeup as yellow flax seed
- Whole flax seed can be kept at room temperature for up to a year
- Once ground, flax seed should be kept in an airtight, opaque container and refrigerated. Ground flax seed kept this way will keep for up to 90 days. It is best to grind whole flax seed as you need it.
To prepare for the Insulin Resistant horse:

1. Buy whole flax seed in a health food store. Don’t buy pre-ground flax because you don’t know when it was ground and it is usually not refrigerated
2. Grind the seeds in a small electric coffee grinder
3. The seeds are best utilized by your horse if first ground up. Whole seeds cannot be digested properly and will pass through with no benefit. Whole seeds might become ground up by the horse’s teeth, but much will be swallowed whole and wasted
4. When you grind the flax, after each use clean out the grinder to prevent residue that may become rancid. Fresh seeds should go into a clean grinder

Flax is the highest plant source of Omega 3 on the planet

Before you buy horse flax products:
- Many have oats and sugars added. You have no idea of the NSC, sugar content
- Many are already ground up, so they are over 90 days old and of questionable value. The Flax Council is in the business of selling flax and if they say it is only good for 90 days after grinding, it is wise to listen
- They are ground but not in an airtight container and are over 90 days old
- They are in huge bags that would take months to get through and if already ground are even more likely to be of questionable value

Evidence in studies show that the Omega 3 and Omega 6 in flax can help decrease inflammatory responses and the need for medications in horses.

Be sure to go to www.equinemed surg.com for additional information and helpful links.

Proper diet and exercise is essential for horse health. This product is a supplement to help maintain horse health. This product is not intended to diagnose, treat, cure, or prevent disease.