



Integrity Hoof's Hat Trick

All three test horses showed improved hoof quality while on this supplement.

Hoof-quality problems are common issues for horse owners. Chipping, splitting, flares, white-line problems, dryness, thin soles/walls and poor growth all usually have a nutritional component. Since hooves are easy to see, grow rapidly and take a lot of punishment, it stands to reason that one of the first places a dietary inadequacy shows up is in the hoof.

But before you run out to buy any old hoof supplement, you've got to know what your individual horse needs. If a particular nutrient is already present in the diet in good amounts, feeding more of it won't help.

CRITICAL NUTRIENTS.

Since the hoof wall is over 90% protein, look first at the amino acids. Alanine, glycine and cystine are the major amino acids in the hoof wall, and the horse can manufacture two of these himself, through exercise (alanine) and glucose production (glycine). Cysteine, however, is produced by the body from methionine, and methionine is an essential amino

acid. An "essential" nutrient is one that must be present in the diet. Your horse's methionine intake needs to be 7 grams/day. Lysine, another important amino acid that is believed to affect hoof wall production, is deficient in many diets. Total daily lysine needs are over 20 grams.

Fats are an important compo-



Horse Journal's hoof supplement recommendations are able to double as all-around supplements, too.

nent of the hoof wall, forming a barrier that keeps water out and prevents the internal tissues from losing moisture. The most important hoof-wall fats are cholesterol sulfate and squalene, but these are easily synthesized by the horse. What the horse must consume are the essential fatty acids. The most important one for hoof health is

omega-3. If the horse is on good pasture, he's probably set, but if he's on hay you'll need to add flaxseed to provide good levels of omega-3. Simply adding 4 oz. of ground stabilized flaxseed or three tablespoons of flaxseed oil should cover your bases there.

B VITAMINS. B vitamins are in high demand in metabolically active tissue, like the hoof. Hay and grass are good sources, and commercial grains are often supplemented to some extent. The organisms in the horse's intestine also synthesizes them. The only B vitamin your horse probably needs is biotin (vitamin B7).

Serious deficiencies of biotin cause skin problems, but even moderately low levels can influence hoof health. Your horse needs 5 to 20 mg/day of biotin, and we'd err on the higher side with hoof issues.

Biotin deficiency has been associated with slow hoof growth and weak, brittle feet, as well as poor white-line

connections. Biotin also stimulates the maturation of skin cells at the coronary band into the specialized horn cells of the hoof wall and increases the production of keratin, the structural protein of the hoof wall.

MINERALS. For hoof quality, look at copper and zinc. Zinc is the most common deficiency in hays across the United States, with copper a close second.

Zinc-containing proteins are responsible for the helical structure of hoof keratin. A zinc deficiency can impact everything from growth to wall thickness to strength of the hoof. An enzyme in the hoof, called the zinc/copper SOD, prevents damage to the lipid barrier of the hoof.

Copper regulates the metabolism of actively dividing cells and

Consider This . . .

- The key nutrients you need in your hoof supplement are biotin, copper, zinc and methionine.
- Flaxseed is an inexpensive way to cover your omega-3 bases.
- Acetone and alcohol, ingredients often found in topical hoof products, can damage the hoof wall.



Nutritional inadequacies can show up first in a horse's hooves.

is needed to form the reinforcing cross links between keratin proteins. Deficiencies of these two minerals are believed to cause soft feet, cracks, sole hemorrhages and increased risk of abscesses, thrush and laminitis.

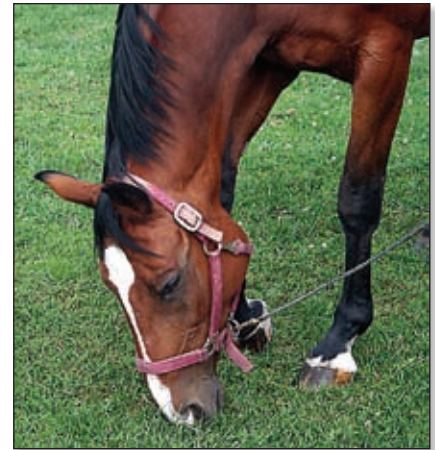
OUR TRIALS. For our field trial, we supplemented three horses for three months with each of the supplements. It takes nine to 12 months to completely grow out a hoof, but three months is sufficient

time for visible changes to occur in the new growth (e.g. tighter growth, no rings, severe cracks stop at the new growth) and for the dead portions of the lower hoof, below the level of the blood supply, to grow out, revealing tighter white lines and even thicker wall. Changes can also be seen in the sole and frog in this amount of time.

To eliminate the influence of poor hoof care, we used only horses being trimmed correctly on a good schedule. Complaints ranged from poor growth, to hoof sensitivity without visible cause, to cracking and white-line issues.

Several horses on supplements where the major (or only) ingredient was biotin showed obvious improvements in coat quality without clear changes in their feet. Results with multi-ingredient products were in favor of products with generous amounts of copper and zinc.

Not only are these two miner-



Grass contains omega-3s, but if your horse isn't on good pasture, he may not be able to consume enough to help.

als frequently deficient, but many hays and pastures also have excessive levels of iron and/or manganese, which can make the situation worse by competing for absorption.

If you're feeding a supplemented feed or mineral supplement that is itself balanced and contains added iron and manganese, your horse could still have hoof problems because the imbalance isn't corrected. Targeting the copper and zinc problem—without adding minerals the horse doesn't need—should be much more effective.

We have a series in the works on mineral balancing, but your target ratios are:

- Iron:Copper: Between 4:1 and 10:1 (the closer to 4:1 the better)
- Copper:Zinc: Between 1:3 and 1:5
- Copper:Manganese: Between 1:3 and 1:5

The same applies to horses on predominantly hay or pasture diets. For hays and pastures of average calorie levels, an 1100-pound horse will likely need 20 to 22 pounds of hay (or an equivalent amount of grass) to hold a normal body condition. At this level of intake, protein as low as 7% will meet your horse's crude protein needs, but essential amino acids may be low, so you will want a supplement with generous protein, like in Integrity Hoof.

Finally, most horses in our trial had access to pasture. If your horse isn't on pasture and you're experi-

Non-Nutritional Factors

- **Poor hoof care:** Improperly balanced feet put uneven loads on the wall that can lead to cracks. Failure to trim frequently causes heel damage and collapse. Overgrown feet also tend to flare, damaging the white line. Filing along the hoof wall to remove rings or other irregularities weakens the lipid layer.
- **Damage from topicals:** Some products contain agents that can damage and dry out the feet. Acetone and alcohol are major offenders.
- **Genetics:** Nature would quickly weed a weak-footed horse out of the population in the wild condition, but modern breeds have often been selectively bred for features other than good feet, so we're stuck with genetic problems.

Don't Blame Sugar

In the wake of all the attention insulin-resistance problems has gotten, many people seem to blame anything and everything on sugar, including with hoof problems like thrush and white-line disease. Not true, and it's causing horses to be pulled off grass and concentrates for no reason. The result is even greater hoof-quality problems.

Don't misunderstand us. Insulin resistance is real, with serious consequences. However, not every horse, or even every fat horse, is insulin-resistant. Before doing severe diet restrictions, have testing done to prove the diagnosis.

encing dryness problems, consider adding flaxseed yourself or using Glanzen 3.

All three of our trial horses responded to Integrity Hoof. We also

experienced high response rates to the Grand Hoof products, Focus HF, Farrier's Formula Double Strength, Hooflex, Horseshoer's Secret, Glanzen 3, Shoer's Friend

Our Best Buy hoof product is Focus HF.



Horse Journal Hoof Supplement Top Recommendations

✓ Horse Journal Editor's Choice \$ Horse Journal Best Buy

Product	Street Price	Biotin	Methionine	Copper	Zinc	Other Ingredients	Comments
✓ Bio-Flax Ultra Horsetech www.horsetech.com 800-831-3309	\$24.95/4 lbs. (32 days) 78¢/day	30 mg	3000 mg	125 mg	360 mg	Per 2 oz.: Protein 13.6 g, fat 11.3 g (6 g of omega-3 fatty acids), lysine 1500 mg, B6 50 mg in base of ground flax and distiller's dried grains. Meal.	Better levels of biotin and B6, less than half the omega-3 requirement, good levels of zinc and copper. Good choice for late-season pastures.
✓ Farrier's Formula Double Strength Life Data Laboratories www.lifedatalabs.com 256-370-7555	\$64/5 kg (59 days) \$1.08/day	20 mg	5304 mg	92 mg	250 mg	Per 85 gram dose: Protein 21,250 mg, lysine 1000 mg, proline, cystine, glycine, tyrosine, phenylalanine less than 1000 mg each, fat 10,200 g, omega-3 fatty acids 760 mg, phospholipids 3600 mg, vitamin C 650 mg, calcium 612 mg (average), phosphorus 722.5 mg, cobalt 1.9 mg, iodine 1.21 mg, choline 505 mg, inositol 560 mg in base of alfalfa meal, soy protein concentrate and yeast. Pellet. Vacuum packed bag.	High protein and methionine, generous fat but light on the omega-3s. Good biotin. Good mineral levels. Comprehensive support on all levels.
✓ \$ Focus HF Source www.4source.com 800-232-2365	\$25.49/3.5 lbs. (37 days) 69¢/day	10 mg	3147 mg	79 mg	255 mg	Per 1.5 oz. serving: Protein 8.505 g, lysine 1616 mg, fat 2551 mg, lecithin 1914 mg, iodine 9 mg, in a base of seaweed meal, alfalfa meal, corn distillers dried grains. Pellet	A little light on lysine and biotin, but good mineral levels overall.
✓ Glanzen 3 Horsetech www.horsetech.com 800-831-3309	\$41.95/12 lbs. (48 days) 87¢/day	20 mg	4333 mg	83.3 mg	240 mg	Per 4 oz. serving: Protein 20.4 g, fat 31.8 g, omega-3 fatty acids 17 g, manganese 130.5 mg, lysine 1000 mg, vitamin E 200 IU, B vitamins in unspecified amount in a base of ground stabilized flax. Powder.	More protein than most. Generous fat including full level of omega-3 fatty acids, good trace mineral levels although more manganese than many hays need.
✓ Grand Hoof Grand Meadows www.grandmeadows.com 800-255-2962	\$49.95/5 lbs. (80 servings) 62¢/day	20 mg	3000 mg	25 mg	250 mg	Per 1 oz. serving: Lysine 1000 mg, yeast culture 1250 mg, pyridoxine 20 mg in base of molasses, flavorings, rice bran, soy grits. Powder.	The original Grand Hoof with same good levels as in the newer Grand Hoof with MSM pellet but lower copper levels.
✓ Grand Hoof with MSM Grand Meadows www.grandmeadows.com 800-255-2962	\$69.95/5 lbs. (80 servings) 87¢/day	20 mg	3000 mg	50 mg	250 mg	Per 1 oz. serving: MSM 5000 mg, lysine 1000 mg, yeast culture 1250 mg, pyridoxine 20 mg in base of molasses, flavorings, rice bran, soy grits.	Good biotin and methionine, moderate pyridoxine, light on lysine, good copper and zinc.
✓ Hooflex W. F. Young www.absorbine.com 800-628-9653	\$60.49/15 lbs. (60 days) \$1/day	15 mg	3000 mg	125 mg	360 mg	Per 4 oz. serving: Protein 14,700 mg, lysine 2750 mg, fat 18.1 g, calcium 1.7 g to 2.26 g, phosphorus 1.7 g, manganese 200 mg, cobalt 25 mg, vitamin A 649 IU, vitamin E 250 IU, in rice bran and hull base. Pellets.	Better protein levels than most with both lysine and methionine generous. Biotin just a little low but excellent copper and zinc levels.
✓ Horseshoer's Secret Concentrate Farnam Horse www.farnamhorse.com 800-234-2269	\$27.21/11 lbs. (29 days) 94¢/day	16 mg	2897 mg	99.6 mg	300 mg	Per 6 oz. serving: Protein 34 g, lysine 1874 mg, fat 8.52 g, omega-3 1363 mg, calcium (average) 3834 g, phosphorus 852 mg, in base of corn distiller's grains, alfalfa meal, soy meal, molasses, flax meal. Pellets.	High protein, fat, zinc and copper. Moderate biotin, lysine, methionine.
✓ Integrity Hoof Kauffman's Animal Health www.ka-hi.com 717-274-3676	\$79/18.75 lbs. (100 days) 79¢/day	20 mg	4200 mg	94 mg	373 mg	Per 3 oz.: Protein 34 g, fat 2.5 g, lysine 2500 mg, glycine 2100 mg, vitamin C 562 mg, choline 150 mg, iron 10 mg, cobalt 4.4 mg, iodine 2.5 mg, manganese 1.7 mg in a base of soybean meal, yeast culture, corn distillers grains with solubles, alfalfa meal. Pellet.	Comprehensive formula. Excellent levels of protein, essential amino acids, biotin and trace minerals. Palatable despite the obvious yeast aroma.
✓ Shoer's Friend Equine America www.equineamerica.com 800-628-9653	\$35.45/11 lbs. (44 days at full dose) 81¢/day	25 mg	1742 mg	95 mg	266 mg	Per 4 oz.: Protein 15.9 grams, Fat 1.7 g, vitamin C 1312 mg, choline 490 mg, inositol 272 mg, glycine 1709 mg, proline 1109 mg, lysine 1134 mg, hydroxyproline/tyrosine less than 1000 mg, iodine 0.8 mg, manganese 170 mg, sulfur 51 mg, in a base of alfalfa meal, yeast culture and wheat midds. Pellets.	Moderate protein and amino acid levels, good biotin, good copper and zinc.
✓ Su-Per Farrier's Supplement Gateway Products www.buygpdirect.com 888-472-2825	\$24.58/5 lbs. (27 days) 91¢/day	25 mg	6660 mg	100 mg	300 mg	Per 3 oz. serving: glycine 2470 mg, lysine 1910 mg, sulfur 1500 mg, vitamin C 1.3 g, proline 1.49 g, gelatin 2.5 g, tyrosine 0.76 g, hydroxyproline 0.64 g, choline chloride 500 mg, inositol 265 mg, iodine 0.8 mg. Base of alfalfa and wheat midds. Crumbles.	High potency dosing of methionine, trace minerals and biotin.

Hoof Supplements Also In Our Field Trial

PRODUCT	STREET PRICE	COMMENTS
Bio-Flax 20/Horsetech www.horsetech.com 800-831-3309	\$40.95/5 lbs. (80 days) 51¢/day	Primarily a biotin supplement, with a little insurance on the methionine and lysine front, provides less than half of the omega-3 requirement. Good add-on for horses on late season pastures.
Bio-Plus/Equine America www.equine-america.com 800-628-9653	\$39.49/5 lbs. (60 days) 66¢/day	High levels of biotin and B6, pantothenic acid. Moderate zinc. Amino acids low. Good coat responses.
Bio-Zin/Mobile Milling www.mobilemilling.com 800-217-4076	\$43.95/12 lbs. (120 days) 37¢/day	High vitamin A. Very high zinc and high zinc-copper ratio makes this a fit only for adequate to high copper and very low zinc hays.
Biotin 800/Kaeco Group www.kaeco.com 800-228-1211	\$27.95/2 lbs. (32 days) 87¢/day	Basically a high-dose biotin and B6 supplement. Improved coats. Best tried with horses known to be getting adequate protein, essential fats and balanced minerals.
Biotin II 22X/Med-Vet www.medvetpharm.com 800-366-8986	\$45.60/5 lbs. (80 days) 57¢/day	Good biotin levels. Moderate pyridoxine, lysine and methionine. Zinc and copper low. More manganese than zinc. Denser coats were observed.
Biotin Complete /Peak Performance Nutrients www.peakperformancenutrients.com 800-944-1984	\$57.95/600 grams (30 servings) \$1.93/day	Good C and B vitamin levels, including biotin. Good amino acids. Copper and zinc low. Good response in one senior. Most appropriate for horses with borderline protein intakes or suspected poor intestinal microbial populations.
Equi-Hoof/Uckele Nutrition www.uckele.com 800-248-0330	\$42.95/3.3 lbs. (100 days) 43¢/day	Good biotin and pyridoxine, moderate amino acid support. Minerals low. Good coat responses. Economical add-on for horses already on adequate protein and mineral intakes.
Four Hoofs/Equilite www.equilite.com 800-942-5483	\$48.95/2 lbs. (32 days) \$1.53/day	Two horse with severe issues with splitting, dryness and poor growth showed no change in growth rate, with insufficient growth to really evaluate for effects. A chronic thrush problem (treated with topicals for months) disappeared in six weeks.
Hoof Support and Anti-Founder Formula/ Earth Lodge Herbals www.earthlodgeherbals.com 860-237-8801	\$35/1 lb. (about 30 days) \$1.17/day	Fragrant mixture of herbs. The horses loved them. No obvious change in hoof quality or rate of growth in our test horses with horn-quality issues. This trial could not evaluate for possible benefits with laminitis.
Hoof Biotin/Uckele Nutrition www.uckele.com 800-248-0330	\$29.95/18 oz. (100 days) 30¢/day	If your bases are covered except for biotin and zinc, we'd try this one at double dose.
Linpro Foxden Equine www.foxdenequine.com 540-337-5450	\$29/5 lbs. (20 days) \$1.45/day	Horses on this supplement had more sheen and luxurious coats, but no obvious change in hoof condition. High biotin. Levels of essential amino acids are low. Good levels of copper and zinc.
Masters Hoof Blend/Vita-Flex/ Farnam www.farnamhorse.com 800-234-2269	\$43.87/3.7 lbs. (59 days) 74¢/day	Biotin at good level, but minerals low with more manganese than zinc and amino acids low. Pass on this unless you only need a biotin supplement.
Next Level Hoof Fluid/Farnam www.farnamhorse.com 800-234-2269	\$30.95/32 oz. (32 days) 97¢/day	Good biotin and moderate methionine, low minerals, low MSM. Very palatable but no obvious response in our test horses.
Platform Hoof Health Formula Farnam Horse www.farnamhorse.com 800-234-2269	\$30.05/2.8 lbs. (45 days) 67¢/day	Good amino acids and biotin, no Bs, mineral levels low. Some coat improvements reported.
Smart Hoof/SmartPak www.smartpakequine.com 800-461-8898	\$13.75/1.75 lbs. (28 days) 49¢/day	Good biotin, moderate amino acids and B6, copper good but a bit low on the zinc for many hays. Improvements in coat density. One horse was beginning to show healthier looking hoof growth at the end of the trial.
Su-Per Hoof with Biotin/ Gateway Products www.buygpdirect.com 888-472-2825	\$14.55/2.5 lbs. (40 servings) 36¢/day	Biotin and zinc in good amounts. Excellent price. Could be a product to try for horses already being supplemented by grain or multi-vitamin supplement but on untested hay.
Super Bio-Zin/Mobile Milling www.mobilemilling.com 800-217-4076	\$75.33/15 lbs. (80 days) 94¢/day	Moderate protein with good lysine and methionine levels, good biotin. High zinc, low copper. Match with hays that are adequate copper but low zinc.



Integrity Hoof is our No. 1 recommended hoof supplement.

and Su-Per Farrier's Formula.

None of these horses were on mineral supplementation balanced to their hay, so "failures" could be due to individual differences in amino-acid profiles, actual mineral levels or omega-3 intakes, not to mention genetic factors.

For example, with Bio-Flax Ultra, the two non-responder horses included a draft horse and a horse with a family history of poor feet, problems a supplement can't fix. With LinPro, we saw positive coat changes in the horses but no expected matching hoof changes. The cause may have been due to the specific protein or mineral needs in the individual horses on these products.

BOTTOM LINE. We consider all of the products on page 4 excellent choices, and not just for hoof health. They also make good all-around supplements.

That said, our No. 1 recommendation for a hoof supplement is Integrity Hoof, with Focus HF squeezing out the nod for hoof supplement Best Buy. 🏆

Article by Dr. Eleanor Kellon, our Veterinary Editor.

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