

Nightmare Situation

BY AMANDA DUCKWORTH

ONE OF THE CORNERSTONES of good horsemanship is a proper feeding schedule. Figuring out the right feed for any horse is important and something many take pride in. Unfortunately, as recently witnessed in Europe, sometimes feed contamination occurs at the manufacturing level, across multiple brands of feed, which is a nightmare situation for everyone involved and affects the horse racing world as well as the show world.

When this happens, it is critical to identify the source, level, and type of contaminant because while some banned substances are not overly harmful to equines in small doses, other times they can be deadly. A silver lining in the latest high-profile case is that physically the horses were fine, but that is not always the result.

At the beginning of October, testing in France revealed the presence of zilpaterol, a banned substance, in five race horses. After this initial rash of positives, France Galop announced an immediate

investigation and found all five of the horses in question had been given feed that included racehorse cubes, racehorse mix, or opti-care balancer, which are all marketed under the brand name Gain.

Feed contamination can take its toll

Gain Equine Nutrition—which supplies a large number of trainers in Ireland and England—informed its customers that batches of its feed were found to have been contaminated with zilpaterol, and they should stop using it.

The company explained in a statement that zilpaterol has never formed part of any formulation in any of its animal nutrition ranges, but after being alerted to the positive test results from France Galop, its quality control team immediately commenced testing its feed products, including both retained samples and product in the market.

“We apologize sincerely to our valued customers for the inconvenience caused by this incident, and we are committed

to promptly keeping you fully informed,” said Martin Ryan, the head of Gain Equine. “A thorough investigation and trace back of all feed ingredient sources is underway as a matter of urgency to determine how this external unapproved feed supplement could have found its way into some batches of our equine product.”

Zilpaterol is unlicensed in Europe, but it is used in the United States, usually as a way to promote weight gain in cattle. The timing of the contamination was notably unfortunate as it led to all 11 horses trained by Aidan, Joseph, and Donnacha O’Brien being withdrawn from the Oct. 4 Prix de l’Arc de Triomphe card at Longchamp, including four runners—Japan, Mogul, Serpentine, and Sovereign—in the main event. Additionally, trainer Roger Varian withdrew all seven of his runners across England Oct. 3.

The race horses were scratched as a precaution because it was unclear whether the substance would clear their systems in time. This is not the first time that cross contamination with zilpaterol has caused issues in horse racing. In 2013 more than 50 cases of zilpaterol positives in California and Hong Kong were proven to be the result of contaminated feed from a Purina mill in California.

In mid-October, Gain announced that several batches of its feed had been manufactured using a consignment of molasses supplied by ED&F Man, which issued a recall notice Oct. 10 stating: “ED&F Man Liquid Products Ireland Ltd. is informing you that products listed below are suspected of containing minute traces of the substance zilpaterol. Although the initial levels detected are extremely low, the substance in question is banned in the European Union.”

According to Gain, it sourced and verified alternative molasses supplies Oct. 5 and resumed the production of equine feed following consultation with the



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Feed contamination was found to be the cause of five race horses in France testing positive for the banned substance zilpaterol

Department of Agriculture, Food and the Marine, the regulatory body responsible for the feed sector in Ireland.

Following the initial announcement that Gain feed had been contaminated, at least six other feed companies have announced that their products have been affected.

“It has very recently been confirmed that the cane molasses containing zilpaterol hydrochloride supplied by ED&F Man Ltd. into Ireland did then enter the UK some months ago and was supplied to a few equine feed companies,” said the British Equestrian Trade Association in a statement. “In that period there have only been positives detected under the rules of racing in France from feed originating from one Irish company.

“In the absence of any confirmatory analysis from ED&F Man Ltd. as to whether and/or what levels of zilpaterol were in any molasses supplied into companies, once aware that the contamination may have affected the UK supply, all companies took precautionary measures and stopped using the shipment of molasses in question from ED&F Man Ltd. and replaced it with an alternative source or another raw material.”

According to BETA, it has been confirmed that the level of zilpaterol that has been found in feed is less than 1 part per billion, which is well below what would trigger food or feed safety considerations. Because of the very low concentrations of zilpaterol in the finished feed, it is not considered significant in terms of food or feed safety and the contamination is not a risk to equine health or welfare.

“Please remember that unless you are participating in affiliated competitions with your horse and therefore could be a subject of a dope test, these feeds are safe to use,” said BETA. “The racing and sporting regulatory bodies have different priorities to our feed regulators, and so while posing no health risks to horses, it is prohibited for horses competing under rules.”

It was very welcomed news that the levels of detected zilpaterol were low, as

it is toxic to horses in large doses. In April 2008 the *Journal of Equine Veterinary Science* published the study “Adverse Effects of Zilpaterol Administration in Horses: Three Cases.”

For the study, three healthy horses were fed the beta-adrenergic agonist feed additive zilpaterol at a dosage of 0.17 mg/kg body weight to observe what would happen. All three horses developed skeletal muscle tremors and tachycardia.

“The horses exhibited restlessness, muscle tremors, and profuse sweating



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Feed contamination forced Britain-based trainer Roger Varian to withdraw runners from English races

20-25 minutes after ingestion of zilpaterol,” the study found. “Tachycardia developed within 40 minutes and took up to two weeks to resolve. Muscle tremors lasted up to one week. The most pronounced derangements in serum biochemistry were increased activities of lactic dehydrogenase, creatine kinase, and aspartate transferase, indicating muscle damage. The most severely affected horse also had transient azotemia, hematuria, and proteinuria, suggesting renal damage.”

After the initial dose, the horses in the study were fed a 75%–87.5% reduced dose of zilpaterol 24 hours later and then administration was discontinued. All three horses recovered without treatment and were clinically normal two-to-three weeks after the initial dose of zilpaterol.

“Because of their anabolic properties, beta-adrenergic feed additives are considered a risk for abuse in performance horses, despite the absence of Food and

Drug Administration approval for such use,” concluded the study. “Oral administration of zilpaterol to horses at the dosage indicated for use in cattle may result in prolonged adverse effects, including tachycardia, muscle tremors, and renal damage.”

Another contamination story that garnered attention in recent years occurred in 2014 when two feed companies—Dodson & Horrell as well as Allen & Page—had to issue a warning due to raw material used in feeds being contaminated by seeds from the morphine poppy. Both manufacturers sourced the affected ingredients from the same supplier, which accepted full responsibility for the contamination.

“Morphine is a naturally occurring prohibited substance,” said BETA at the time. “As the name implies, it is naturally present within certain feed ingredients or can arise as a result of inadvertent cross-contamination during processing and/or transport and storage. While the presence of poppy seeds may be minimal, it may still be sufficient for the trace amounts of morphine subsequently present to cause a horse to fail a dope test. The substance itself at the levels found is of no concern for either human or horse welfare.”

The investigation into the contamination began after multiple horses began failing their post-race tests—including the Queen’s group 1-winning mare Estimate.

While in these cases the horses were exposed to minimal amounts of the banned substances, and therefore were not at-risk health-wise, that unfortunately is not always the result, especially when it comes to monensin contamination.

For example, in 2015, California-based manufacturer Western Milling sold feed that was contaminated with monensin that ended up killing 21 horses and caused 28 others to become severely ill. In 2018 it was announced the company would pay \$2.4 million to settle a lawsuit for selling the tainted feed.

In late 2018 the U.S. Food and Drug Administration issued warning letters to two feed mills—Gilman Co-op Creamery

MESSAGE FROM THE GRAYSON-JOCKEY CLUB RESEARCH FOUNDATION

NUTRITIONAL MANAGEMENT OF THE EQUINE METABOLIC SYNDROME HORSE—A TOPIC THAT NEEDS MORE RESEARCH

BY DR. AMANDA ADAMS

Insulin dysregulation is characterized by increased insulin responses to oral sugars, hyperinsulinemia, or tissue insulin resistance. It is most often associated with equine metabolic syndrome, which predisposes horses to laminitis. Laminitis is a devastating inflammatory condition that causes severe pain and often leads to euthanasia.



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Similarly to humans, vast amounts of nutrients are available to horse owners, which often leads to equine obesity and the development of insulin dysregulation. It remains to be determined how to nutritionally manage EMS horses in order to control the postprandial response in EMS-ID horses, thereby reducing the risk for laminitis. While it is recommended to maintain EMS-ID horses on a forage only diet and avoid feeding grain, no research has been conducted to determine the effects of forage nutrient content on insulin responses in EMS-ID horses. It remains to be determined what level of non-structural carbohydrates and protein in forage will cause an exaggerated metabolic response in EMS-ID horses compared to metabolically normal horses.

The long-term goal of our ongoing research is to define mechanisms that drive insulin dysregulation and the development of laminitis, and to identify strategies that might provide improved nutritional management practices to protect horses from devastating occurrences of laminitis.

Nutritional management is a crucial topic that has not been fully addressed in the EMS-ID horse. The Equine Endocrinology Group suggests managing EMS-ID horses with nutrition; however, there are currently no science-based recommendations for EMS-ID horses.

When discussing this topic, there are two considerations: 1) what to feed the EMS horse and 2) how much to feed the EMS horse. The EEG recommends to maintain the EMS horse on an all forage

diet, avoiding grain and to restrict the amount of forage to a certain percentage of body weight of the horse to help induce weight loss or to maintain body weight. What we don't know is "what" forage is safe to feed the EMS horse to reduce the insulin response to feeding.

Forage varies tremendously in terms of nutrient content of sugars, starches, and protein, all of which can influence the metabolic response in an EMS horse. For example, an alfalfa forage is likely going to be higher in protein content compared to an all-timothy forage. Currently it remains unknown what nutrient content of non-structural carbohydrates (NSC) or crude protein (CP), and nutrient content levels drive exaggerated insulin response in EMS-ID. One study found that forage (hay) less than <12% NSC would lower insulinemic and glycemic responses in polysaccharide storage myopathy (PSSM) horses. Although this study was conducted in a group of PSSM horses (n=7), this dietary recommendation has been spread across literature, including recent journal articles and a popular, well referenced book, *Equine Applied and Clinical Nutrition: Health, Welfare and Performance*, as guidelines to feeding EMS-ID horses.

Even the American College of Veterinary Internal Medicine recommends that EMS-ID horses should be fed <12% NSC hay content. The most recent consensus statement to be released by the European College of Equine Internal Medicine stated that horses should be fed <10% NSC,

which came from a paper that was not conducted in EMS-ID horses.

There have been a few studies to try and understand the effects of NSC on insulin responses, but no work has provided a complete understanding of what levels of CP or NSC that affects insulin response in EMS-ID horses.

One group of researchers performed a study in ID and healthy ponies that compared the insulin response to three types of hays varying in NSC content. When soaked hay (10.9 + 2.5 % NSC), dry hay (16 + 2.6 % NSC), and haylage (18.5 + 4.1% NSC) were compared, ID ponies' insulin response remained statistically higher than that of healthy ponies, even with the soaked hay that had 10.9% NSC. The soaked hay, however, did significantly decrease the insulinemic response in ID ponies compared to haylage. This work was conducted in ID ponies; therefore, it is still yet to be determined whether EMS-ID horses respond the same as ponies. Another recent study found that a high-protein meal given to EMS-ID horses produces a nine-fold greater response in insulin secretion compared to that of healthy horses.

In summary, the current recommendations by many groups of feeding <12% NSC in forages is best for EMS-ID horses. If low NSC forage is not available, then soak the hay in water for at least 30 minutes to achieve lower NSC. Moreover, based on the EEG recommendations, to induce weight loss in EMS horses feed 1.5% of body weight in forage for 30 days

then weigh the horse. If weight loss has been achieved, then feed at that current rate; if not, then feed at 1.2% body weight in forage but no lower. It is important to reassess body weight in the EMS horse undergoing weight loss. Since the EMS horse should be maintained on an all-forage diet, it is also important to provide

a vitamin/mineral/ration balancer that is safe for the EMS horse and does not induce an insulin response. **BH**

Dr. Amanda Adams is an associate professor at the University of Kentucky Gluck Equine Research Center.

in Minnesota and Farmers Ranchers Cooperative Association of Ainsworth, Neb.—that mixed horse feed containing monensin. They had not adhered to the Current Good Manufacturing Practice requirements for medicated feed mills.

“Monensin contamination of horse feed is an infrequent but persistent issue, often causing deaths of multiple horses,” read the FDA’s statement. “These incidents of monensin toxicity should be a reminder to all feed manufacturers making medicated feeds that they must remain vigilant about adhering to CGMP requirements by eliminating unsafe carryover of medications into feed intended for different species.

“The FDA reminds people who think their horses or livestock are ill from consuming adulterated food to immediately stop feeding the suspect food to any animals, regardless of whether they show symptoms, and to contact a veterinarian.”

Monensin, which is incredibly dangerous for horses to ingest and can be lethal even at relatively low doses, is often used to kill parasites and aid in weight gain in cattle, swine, and poultry. The November 2020 issue of *Equine Veterinary Journal* delved into the issue in the study “Acute, subacute, and chronic sequelae of horses accidentally exposed to monensin-contaminated feed.”

According to the observational clinical study, a physical examination, electrocardiogram, and echocardiography were performed on 76 horses accidentally exposed to monensin-contaminated feed. From those 76, four were examined within two weeks of exposure, 29 were examined between 15-45 days, and 70 were examined four-to-10 months after exposure. Approximately 16 months after exposure, follow-up information was obtained for 56 of the horses via telephone.

The study found that cardiac abnormalities were detected in 4/4 (100%), 19/29 (65.5%), and 31/70 (44%) of the horses during the respective examination periods. In all, 34 of the 64 horses for which the outcome was known had returned to their previous use, 13 were reported to be exercise intolerant, three were retired, and 14 were dead.

“Monensin is highly toxic to horses and inadvertent ingestion can result in cardiac injury and death,” the study said. “Thinning of the myocardium observed at any point in time was associated with a negative outcome. Heterogeneity of the myocardium observed in the acute/subacute period was associated with a negative outcome while subjective contractile intraventricular dyssynchrony, cardiac chamber dilation, decreased fractional shortening and multiple premature ventricular complexes

observed in the chronic period were associated with a negative outcome.

“Some horses with significant changes associated with a negative outcome in the chronic phase still returned to their previous work. Clinical outcome of horses exposed to sublethal doses of monensin is highly variable.”

Ultimately, feed contamination at the manufacturing level is beyond the control of horse owners. However, it can be helpful to research how a feed company produces its products, and it is certainly important to be alert to any recalls. In some cases, feed contamination is mainly a concern for horses that are actively racing or showing, due to testing regulations while in others it can have deadly consequences. **BH**

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