
BREEDERS ALARMED AT MOUNTING FOAL LOSSES

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By Janet Patton, Herald-Leader Business Writer

BREEDERS ALARMED AT MOUNTING FOAL LOSSES
WAVE OF MISCARRIAGES, STILLBIRTHS HITS MARES

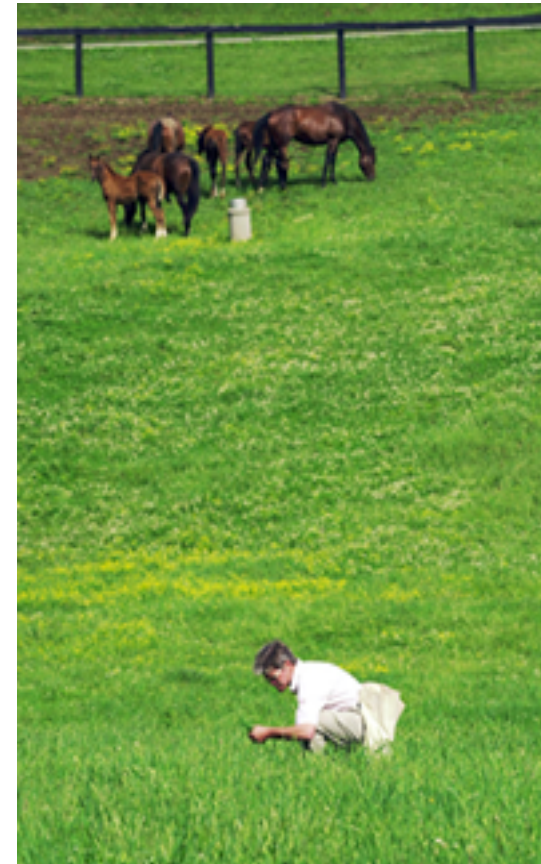
A mysterious wave of death is sweeping through the horse breeding community, a financial mainstay of Central Kentucky.

Although hard numbers are scarce, anecdotal reports from farms indicate as many as one in four mares have miscarried or delivered stillborn foals.

On some farms, the numbers could be as high as 75 percent, said Dr. Doug Byars of Hagyard-Davidson-McGee, Lexington veterinarians. "It affects all the Central Kentucky counties, and there's probably something similar going on outside of Central Kentucky. We've even had some indications it's occurring in other states as well."

About 2 1/2 weeks ago vets began seeing abnormal foalings -- placentas coming out first, with well-formed but listless foals that often didn't survive, Byars said. "It was fairly clear something was bothering these mares," he said. "Some of the mares themselves were affected -- trembling and such."

Altogether, hundreds of mares have been hit, he said. "The early-pregnancy losses might even be larger," Byars said. Mares are losing their fetuses after



05/13/2001 - Roger Allman, an agronomist, clipped grass for analysis on a horse farm near Lexington. "I haven't got any answers yet," he said.

Source: LEXINGTON HERALD-LEADER
Photographer: DAVID STEPHENSON

being pregnant for a couple of months, he said. The miscarriages began surfacing about a week ago, and new cases of miscarriage and stillbirth are still being reported.

"There is quite a serious problem that's occurring at this time," said Dr. David Powell, an epidemiologist at the Maxwell E. Gluck Equine Research Center at the University of Kentucky.

Powell said he doesn't know yet what's causing the losses. Theories among breeders range from bagworms to a toxic fungus on the grass. It is not clear that the miscarriages and the stillbirths stem from the same cause.

Powell said Gluck, which sent a memo on the problem to all Kentucky horse vets on Sunday, has begun surveying farms and hopes to have numbers on Wednesday about the scope of the problem.

UK veterinary researchers and others in the industry are holding a news briefing this afternoon about the losses. Information also could be presented at a joint meeting 5 p.m. Thursday of the Kentucky Thoroughbred Farm Managers' Club and the Kentucky Association of Equine Practitioners at the Keeneland sales pavilion.

The Livestock Disease Diagnostic Center in Lexington has been conducting necropsies to help determine the cause. They've seen 30 to 60 cases a day for at least a week.

The problem is not confined to thoroughbreds.

Art Zubrod of Brittany Farms, a standardbred farm in Versailles, said his farm has been hit hard in the last week.

"I've had five abortions of near-term foals from mares three weeks from their due date," he said. Five other mares had embryos with detectable heartbeats at 68 days of pregnancy that were gone two days later, and he expects at least five more mares to abort.

'Millions of dollars'

"It's costing millions of dollars -- we've lost over a million and half between the embryos and the foals lost," Zubrod said. "And we're talking about standardbreds ... the losses in thoroughbreds with their higher stud fees, you're talking tens of millions at least. And the majority of these mares won't get pregnant again this year."

Duncan Taylor of Taylor Made Farms in Lexington said he noticed the problem last week during an ultrasound to determine fetal sex.

Because the sex of foal is checked only if an owner wants to know, it's fairly random.

But Taylor said an unusual number of mares were no longer in foal.

So a check was done on all the mares at Taylor Made and Gluck was alerted. "It's affecting the whole population," Taylor said.

Gus Koch, farm manager for Claiborne Farm in Paris, had another case yesterday and doesn't think the problem has stopped.

"We've never seen numbers like this," Koch said. The financial losses to the billion-dollar breeding business are "going to be huge because of the mare owners, the stallion owners, the farms, the insurers."

A mare owner who loses a foal might not have to pay the stud fee, but that mare owner also won't have a product to sell.

Consequently, horse insurance agencies are being bombarded with requests either for policies or for claims.

"We've had more than the normal number of requests for expected-foal coverage," said Nina Hahn, who writes insurance coverage.

Foals can be insured after the mare has been pregnant for 42 days.

Philip Meyer of Bohannon-Meyer Insurance in Versailles said that he's heard from other agents that "the panic is just starting."

"Normally, you get to that 42 days after breeding and everything's supposed to be fine," Meyer said. "This year it's not."

The Jockey Club, which tracks all thoroughbred births, said it's too soon to measure the effect. Before April, foal reports had been running about 10 percent ahead of the previous year, said John Cooney, Jockey Club spokesman.

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CARCASSES PILE UP, BUT THE KILLER REMAINS ELUSIVE
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By Janet Patton, Herald-Leader Business Writer

CARCASSES PILE UP, BUT THE KILLER REMAINS ELUSIVE

Dr. Tom Riddle had some sad news for a Jessamine County breeder: The foal in one of his mares had died.

He could feel what should have been a healthy, month-and-a-half old foal inside, but there was no heartbeat.

Riddle, a Lexington veterinarian who is an internationally recognized horse-reproduction expert, was doing routine ultrasounds on six broodmares at Taylor Made Farm to determine the sex of their foals.

When Riddle moved on to the next mare, he found something astonishing: a second dead foal.

"That was very unusual. Last year, I found five out of 400 in the entire year," Riddle said. Now he had two on the same farm -- in the same barn.

He was concerned, but "I just assumed this was extremely bad luck."

It was, but not just for one Jessamine County farm.

Riddle didn't know it that day, April 26, but he'd just encountered a wave of death that was sweeping the Bluegrass, a mystery that is still baffling dozens of scientists.

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Over the next four days, Riddle found more mares carrying dead foals in Woodford and Bourbon counties, and learned from the Taylor Made farm vet that several more cases had been found on the first farm.

"I became very suspicious that the cases in Jessamine County were related to the other cases," Riddle said. "Unfortunately, I've seen many more cases since then."

Riddle called Neal Williams, a pathologist at the University of Kentucky's Livestock Disease Diagnostic Center and Dr. Roberta Dwyer, a researcher at UK's Gluck Equine Research Center.

"I told them I was very concerned there was a syndrome causing the deaths of fetuses in the 60-day range, and I did not know the cause," Riddle said.

Neither Williams nor Dwyer had heard about the problem before. Williams offered to examine the fetuses, and Dwyer said she'd come out to the farm the next day.

Duncan Taylor, a savvy horseman whose farm consigned \$76.4 million in horses at Keeneland's three largest sales last year, also had become concerned. He'd asked around, and neither his neighbors nor his competitors seemed to be having problems. He decided to have all his mares that were more than two months along checked.

"It felt like a tidal wave," Taylor said. "That's when we said, 'We've

definitely got a problem'."

Dwyer and Dr. David Powell, an epidemiologist at Gluck, came to the farm. By then, they'd begun to hear of similar problems on other farms.

It was clear that Taylor wasn't alone. In fact, his inquiries may have alerted other horse farms.

Many thought they had no problems simply because they hadn't looked. Typically, ultrasound is used to check mares at 15 days and 28 days after breeding. At 42 days and 60 days, the exams are typically done by hand, unless the vet is trying to determine the sex of the fetus.

Suddenly, Central Kentucky vets were inundated with requests for ultrasounds.

They began finding that hundreds of mares had either aborted or were about to lose their foals, the products of breedings that can range from a few thousand dollars to a few hundred thousand.

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The thoroughbred breeding cycle is fairly rigid. Gestation takes about 340 days, or 11 months.

Because all thoroughbreds have an official birthdate of Jan. 1, breeders plan for their mares to give birth as early in the spring as possible for two reasons: so the foal will not be significantly younger than the rest of its class, and so the mare will have time to cycle back into heat and conceive again for next year.

In April, there are two kinds of pregnant mares: those who are just about to give birth, and those who have young foals and have already been bred again.

Until late April, mares were still having normal pregnancies and foaling normally.

But by Wednesday, May 2, Dr. Lenn Harrison, the director of the livestock

diagnostic center on Newtown Pike in Lexington, was very concerned: Too many dead foals were arriving there.

"Things really started to get out of whack," Harrison said.

Many of the foals had died as a result of "red bag" deliveries, in which the placenta either comes out first or covers the foal, which often dies from a lack of oxygen.

The three people who handle incoming specimens at the center were soon overwhelmed.

"Looking back, I probably should have said something on Wednesday to a few other folks," Harrison said.

The next day was worse.

"We open at 8. They were already there, knocking on the door ... wanting answers," Harrison said.

People from farms were lined up in the parking lot well into the evening delivering dead foals. The horsemen talked to each other as they waited. For some, it was the first time they knew the catastrophe wasn't theirs alone.

"They were really hot and concerned. ... They were afraid, more than anything," Harrison said. "It was becoming more and more clear, what we were seeing wasn't ..." Harrison's voice trailed off as he searched for words.

Specimens were stacking up, and the atmosphere was affecting even seasoned professionals. A disposal company had to haul away truckloads of dead foals, because the center's incinerator was overloaded.

On May 5, the day of the Kentucky Derby, 73 dead foals were delivered to the center.

At Churchill Downs, thousands of owners, breeders, farm employees and horse lovers celebrated the new king of the thoroughbred world, Monarchos.

Few of them knew about the body count in Lexington.

Meanwhile, some foals were just barely staying alive.

Since the last week in April, veterinary hospitals had been seeing mysteriously ill newborn foals.

"Then it came in kind of a barrage," said Dr. Doug Byars of Hagyard-Davidson-McGee. The ICU filled up, then the makeshift stalls filled up, so they made a stall out of the feed room. And still the foals kept coming.

The clinic put foals on a waiting list. Vets were warned not to just send their patients over or they'd be fined.

"Somebody said, 'It's a forest fire.' Another person said, 'It's a brush fire.' I said, 'It's somewhere in between,'" Harrison said. "Economically, it's a forest fire, certainly."

By Monday, May 7, the search for answers was in full swing. The center was turning away calls for information, because the staff needed the time for work. Any delay at that point was too much, Harrison said, shaking his head.

By the afternoon of May 8, Harrison was able to give the media and the public a few answers-- and the first indication of the true size of the phenomenon.

Since April 28, the lab had received 318 aborted fetuses or stillborn foals, nearly seven times the number received during the same time frame a year ago.

There was also some comfort: All tests for viruses and infectious agents had proved negative.

But there was also some distressing news. While scientists were pretty sure what wasn't killing the state's foals, they were still far from pinpointing what was.

They knew it wasn't nitrates or nitrites; abnormal levels of copper, iron, zinc or selenium; herpes virus 1 or 4; equine arteritis virus or adenovirus; West Nile virus; or leptospirosis.

The hunt turned to environmental possibilities. Water and purchased feed had largely been eliminated because of the lack of consistent factors among the affected horses.

That left the very thing that first drew horsemen to Kentucky.

Said John Williams, who found out the day after the Kentucky Derby that he'd lost a foal by the winner's sire, Maria's Mon: "You can call those pastures the killing fields."

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One of the few consistent factors has been the inconsistent weather this spring, the early heat, late frost and drought.

Since May 2, forage experts have walked miles across Kentucky searching for clues. Hundreds of times, they have bent over, clipped a sample of grass and sent it to a lab. They have searched fields that have been heavily managed and fields that are virtually untouched; pastures with and without fescue; plots of clover, bluegrass and every other grass.

Several theories have been put forward -- fescue toxicity, mycotoxins, phytoestrogens. Researchers say everything is under consideration, that nothing (except maybe tent caterpillars) has been ruled out. Some symptoms fit; others don't.

Test results should start arriving over the next few days. Some early results seem to support the mycotoxins theory, prompting a rush to feed stores to buy products marketed as "binders" that could carry the toxins safely out of a horse's gut.

Like most of the people involved, Roger Allman, a private agronomist, will not speculate.

For the past 15 years, he has made it his business to know thoroughbred pastures as few others do.

"I do soil analysis for more quality thoroughbred horse farms than anyone

else in the world," Allman said. He had recently returned from a month of taking samples on European horse farms, just as he does every April, when he got a call from Frank Taylor of Taylor Made Farms on May 2.

"It was very clear from Frank that he had an extremely severe problem," Allman said. He arrived the next day. "In hindsight, I feel bad that I wasn't there on Wednesday." Does he think it might have made a difference? "It may have," he said.

Allman, like UK agronomists, has stayed focused on his specific tasks, "on going in a direction that can help the researchers." He knows that what he is actually collecting is what the horses left behind, not what they ate. Like people they have different tastes.

Often, there are horses in the fields. As he goes by, he sometimes wishes they could tell him something.

"I haven't got any answers yet," he said.

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Everyone involved in the investigation has shown "an unbelievable level of dedication," said Dr. Roger Murphy, head of the Kentucky Association of Equine Practitioners.

Murphy also credited the vets and nurses who have fought to save the precious commodity of the billion-dollar Bluegrass industry. "Without them, the situation would have been much worse," Murphy said.

The search goes on, and despite this season of death, life goes on.

Many breeders are hoping that mares who have aborted can be bred again and foal next spring.

But Dr. Riddle, who has examined many mares, has doubts.

Many of the mares won't be able to get pregnant until four months after their previous conception, he said. The earliest ones might make it.

Riddle is still finding cases. "I don't know that we can say the incidence

of loss has changed," Riddle said.

Sick foals are still being brought into veterinary clinics.

And foals are still dying. Yesterday, 14 more were brought to the diagnostic center, bringing the total to 418; 100 have come in since noon Tuesday. Harrison thinks the numbers are declining. "There's less mares getting ready to foal, so the numbers should be dropping."

And vets are seeing symptoms in all horses. Sucklings, weanlings, yearlings, mares and stallions have everything from unexplained fevers to inflamed eyes to fluid around the heart.

Although no one really knows yet, estimates of the dollar damage range from \$150 million to a quarter of a billion dollars. Kentucky's congressional delegation has asked the USDA for relief.

Yearlings that should be getting bigger and stronger for the yearling sales at Keeneland in July and September are losing weight, something unheard of in Kentucky in April.

Taylor Made, like many farms, is mowing its pastures on recommendations from the experts. Duncan Taylor, who's been dealing with worried customers and stallion owners since word got out, is concerned that the farm will be unfairly associated with the crisis because it was the first to step forward.

"Everybody had the same grass, the same freeze, the same drought," Taylor said.

Horse-industry people are not the only ones who are concerned. People all over the Bluegrass, and the world, have called in or e-mailed questions, thoughts and suggestions.

Powell, who has coordinated the investigation from his office at the Gluck center, got more than 50 e-mails before 6 a.m. yesterday.

"There are a lot of people who are genuinely concerned about the welfare of the horse," Powell said.

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Herald-Leader photographer David Stephenson contributed to this report.

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After 17 days and 418 dead foals, horsemen still have no answers

CAPTION: DAVID STEPHENSON/STAFF

Ronnie Morgan mowed a pasture at Taylor Made Farm in Jessamine County. A leading theory blames toxins in horses' diets for the Bluegrass' recent scourge of foal deaths, so experts are recommending that farms cut their grass.

DAVID STEPHENSON/STAFF

Pregnant mares grazed at Taylor Made Farm in Jessamine County, where veterinarian Tom Riddle first encountered the recent epidemic of foal deaths.

PHOTOS BY DAVID STEPHENSON/STAFF

Dr. Tom Riddle checked a mare at Elmwood Farm in Woodford County. The farm has lost two foals; one of them was by Maria's Mon, sire of Kentucky Derby winner Monarchos.

John Williams of Elmwood Farm calls his pastures "the killing fields."

Dr. Tom Riddle found two dead foals on one day, in the same barn.

Roger Allman, an agronomist, clipped grass for analysis on a horse farm near Lexington. "I haven't got any answers yet," he said.

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VETERINARY, FARM WORKERS AFFECTED BY HIGH FOAL LOSS

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By Janet Patton, Herald-Leader Business Writer

VETERINARY, FARM WORKERS AFFECTED BY HIGH FOAL LOSS

The miracles keep them going.

Over the last month, as the dead foals piled up and the desperately sick ones kept coming, workers at vet clinics and on farms have been buoyed by the foals who beat the odds.

"It's always a hard part of the job to lose one," said Matilda Lee, night shift ICU team leader at Hagyard-Davidson-McGee veterinary clinic. "When one makes it and lives, it's wonderful."

The veterinary nurses change bedding, disinfect stalls, give medication ... and try not to get too involved.

"You always have certain patients you spend more time with," Lee said. Unfortunately, those tend to be the sickest, the "bed babies," limp and virtually lifeless.

But recovery can be miraculous. A foal can "crash" three times a day and be up and walking, tiny tail swishing, later that week.

To see one come home would be a big relief for Jerry Snyder of Holly Lane Farm in Lexington. Snyder breeds standardbreds for the harness tracks. He's lost nine foals, nearly a third of his expected crop this year, to mare reproductive loss syndrome.

Some were stillborn, others had heartbeats but never started breathing. "The last four lasted an hour to 16 (hours) with support," he said.

Only one filly is likely to make it.



05/13/2001 - Pregnant mares graze at Taylor Made Farm in Jessamine County where veterinarian Tom Riddle first encountered the recent epidemic of foal deaths.

Source: LEXINGTON HERALD-LEADER
Photographer: DAVID STEPHENSON

One of Snyder's colts got to the ICU last week 15 minutes after he was born, a "red bag" foal two weeks premature.

His mother wore a borrowed halter with the name "Hail Mary" on the brass tag, but the sentiment and all the nurses' care couldn't save her son.

He was "just a train wreck," said Lynne Hewlitt, day shift ICU supervisor. He survived less than 12 hours.

A FRAGILE BUSINESS

It may be years before the full economic impact of the crisis is known. But the emotional and mental toll is more immediate.

Snyder said it's been hard on him and hard on his stable hands.

"They've been very worried, and they've tried to help," he said. At first, they were concerned they were doing something wrong. "There's always that little element of self-doubt." But the sick or dead foals just kept coming.

"There is a numbness," he said.

Standardbreds, while generally less valuable than thoroughbreds, are still expensive horses. That heightens the pressure. "It's almost like you can't turn your back," Snyder said. "There's a tension about it. ... It's not a happy time. You learn this is a fragile business, but it never makes death or tragedy any easier."

He has three mares left to foal, and he's almost afraid to hope. "It's extremely hard. I'm at a point where I hate to hear the telephone ring," Snyder said.

NOW, IT'S EVERY DAY

"I used to cry all the time when I first started," said Hewlitt, who's been a veterinary nurse for more than a dozen years. "I don't cry any more."

The last few weeks, they haven't had time to cry, even if they wanted to.

Dozens of deathly ill foals have poured in, filling even improvised stalls at Hagyard-Davidson-McGee.

The scene at Rood & Riddle Equine Hospital has been similar: frantically busy vets and nurses tending to as many as 15 new foal cases a day. And a flurry of other unusual symptoms -- heart and eye problems, for instance -- have also cropped up.

"I've been running around scanning everything -- hearts, pregnant mares," said Dr. Johanna Reimer, who specializes in cardiology and internal medicine.

"We're all wearing down ... wearing down," Hewlitt said. There has been lots of overtime, lots of eating on the run, and lots of stress.

Spring is normally a very busy time for these clinics. Hagyard-Davidson-McGee, for instance, ordinarily sees about 450 neonatal patients. To cope, they hire seasonal help -- veterinary students and nurses from all over the world come to Lexington for the breeding season.

But the last few weeks have been especially trying.

How do they cope?

"We laugh a lot," Lee said.

"You have to laugh or you'd be crying," Hewlitt said.

There are open stalls now, but sick foals are still coming in and many won't make it. Dr. Doug Byars at Hagyard-Davidson-McGee doesn't know exactly how many syndrome foals they've had, but he knows it's been dozens. At best, about half have survived.

Take last Monday. "One died when I came in to work. Another one died at lunchtime. And another died when I was getting ready to leave," Hewlitt said. "That's a bad day."

Normally, every three or four days a patient might die. "Now it's every day," she said.

BETTER NOT TO KNOW

Even when it's that bad, they don't dread coming to work, the nurses say.

"When you start out with one on a bed, when it's just a big blob, and you

see it start to get up, then see it run around, it's incredible," Hewlitt said.

But these caretakers know that just going home doesn't necessarily mean a happy ending for these foals, many of whom are still fragile. An owner may eventually decide the battle isn't worth the cost and euthanize a weak foal.

"We don't know what happens when they go home ... that's probably for the best," Hewlitt said quietly. "It's almost better that we don't know, especially the ones we worked on for so long."

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'THE CATERPILLAR KEEPS CRAWLING BACK INTO THE EQUATION'

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By Janet Patton, Herald-Leader Business Writer

'THE CATERPILLAR KEEPS CRAWLING BACK INTO THE EQUATION'

FUZZY BUG PRIME SUSPECT IN FOAL DEATHS AS OTHER THINGS DEAD-END

A group of key researchers gathered yesterday for a scientific "summit



05/13/2001- A sick foal rested at Rood & Riddle Equine Hospital in Lexington on Friday as Kentucky's dead-foal count reached 404.

meeting," to pore over data in an effort to sort out the suspects for what's killing Kentucky's foals and causing strange symptoms in other horses.

The latest, most sophisticated tests, though, contradict last week's findings and refocused attention on a cause that had been pushed aside earlier.

"Our major suspects have damn good alibis," said Steve Jackson, a horse nutrition expert, who attended the meeting at the Gluck Equine Research Center.

Jackson said that has led researchers back to a theory that most of the scientists originally were skeptical about: "the dang Eastern tent caterpillar."

"The caterpillar just keeps crawling back into the equation," said Jackson. "There's a lot of emphasis on looking at that."

"The other things have come up with dead ends ... or there are so many holes in them that they seem to be dead ends," he said.

Jackson initially favored another theory -- toxins from fungi on grasses. Other scientists favored other possibilities, all linked with symptoms in the sick or dead foals and horses. A total of 528 dead foals have been delivered to the diagnostic center since April 28, including 12 yesterday.

The researchers had sent samples of grasses collected after May 5 to labs around the country for sophisticated tests. The results reviewed yesterday by scientists from the University of Kentucky, Gluck and the UK Livestock Disease Diagnostic Center, yielded negatives for the major mycotoxins (including zearalonone, which preliminary tests found last week), ergot alkaloids, and endophytic fungi that grow in grasses such as fescue.

"I'm probably going to eat some major crow," said Jackson, "but I think we've eliminated (mycotoxins.)"

But if the guilty party is the caterpillar, it likely has an accomplice.

Black or wild cherry trees, the caterpillar's habitat and food of choice, are known to be highly poisonous, he said. The cherry leaves can produce cyanidelike compounds that can turn into the poison in the caterpillar's gut.

"We have in fact observed in the field a close correlation between the presence of tent caterpillars and cherry trees and the incidence of problems," Scott Smith, UK college of agriculture dean, said last night. "The other stuff is not adding up."

But there are still a lot of unanswered questions about this theory, too.

"We don't really understand how the toxins might accumulate in the caterpillar, if they do, and end up in the horse, if they do," Smith said.

Smith said the caterpillars are inactive now and it's "very unlikely" that any toxin is still present. "If this is the case, it's the wrong time to eliminate the cherry trees."

Original tests on the caterpillars were negative for cyanide; later tests were positive for the mycotoxin zearalonone. This had led researchers in circles trying to make the links among the caterpillars, the trees and the horses.

Since the caterpillars are gone, part of the problem now will be finding anything to test.

The researchers are asking for samples of hay cut during the caterpillar infestation, feed and fluids from mares.

An informational meeting is planned for 5 p.m. Thursday at Keeneland so the researchers can share the latest findings with farm managers and veterinarians, who have expressed frustration with the level of communication.

Some veterinarians, including Dr. Doug Byars of Hagyard-Davidson-McGee and Dr. Bill Bernard of Rood & Riddle Equine Hospital, had their own emergency meeting Saturday with Gluck director Dr. Peter Timoney to get more information. To that end, Gluck is supposed to begin faxing the vets a daily

briefing, and vets will fax in any clinical information they want to share with the researchers.

Previously, key equine clinics had not been contacted to provide details -- or even numbers -- of their mare reproductive loss cases.

Byars said fewer new cases are coming in, but now the vets have begun scanning yearlings' hearts so they can be proven sound at the crucial July and September Keeneland sales.

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THE ANSWER WAS CHEWING ON THE LEAVES
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By Janet Patton, Herald-Leader Business Writer

THE ANSWER WAS CHEWING ON THE LEAVES
DEDUCTION AND DETERMINATION SOLVED STATE'S FOAL-DEATH MYSTERY

A week into investigating Kentucky's horse crisis, Dr. Lenn Harrison was stumped.

Nothing was adding up, except dead foals.

More than 442 had been brought to the University of Kentucky's Livestock

Disease Diagnostic Center by the evening of Monday, May 14.

What were they overlooking? Harrison wondered.

As Sherlock Holmes put it, when you eliminate the impossible, whatever remains, however improbable, must be the truth.

The clues to this conundrum would be a book, a tree, a caterpillar and a murder-mystery classic -- cyanide.

Harrison returned to a theory all but dismissed early on: Eastern tent caterpillars.

"The problem I was having is what they were telling me about the caterpillars didn't add up," Harrison said. They were harmless -- cute, even -- a dead end.

"But when we went out to the farms and looked, there was a very distinct pattern of heavy caterpillar migration," Harrison said. They sometimes crossed roads to build cocoons, and "sometimes they went right across the fields where the horses were."

Harrison drove to UK's W.T. Young Library, named for the owner of the most expensive stallion in the world, looking for answers.

He found them in an obscure reference, a 6-inch-by-8-inch, 303-page work published in 1995, *The Tent Caterpillars* by Terrence Fitzgerald, a New York entomologist who devoted his life to studying caterpillars.

Reading late into the night, Harrison was galvanized by what he discovered.

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UK agronomist Jimmy Henning was also feeling "fairly frustrated." His team had been gathering pasture samples for a week, and it had been slow going.

The early, hot theory about what was killing the foals centered on mycotoxins, a very rare set of poisons produced by fungi on grass. Grass samples had to be frozen; the right testing labs had to be found.

The team had already been turned down by one lab in California. The job was

"too hot," Henning said.

By Tuesday, May 15, he'd finally sent two batches of samples to a lab in Missouri. Henning had suspected for a week that mycotoxins were not the problem.

"I could not come to grips with the idea that we've got something in our pastures for the first time in 100 years," Henning said. "It just wasn't logical."

The mycotoxins, along with other exotic theories, such as plant-based estrogens, ergot alkaloids and endophytes in fescue or other grasses, had been debated when scientists got together about a week earlier.

Tent caterpillars were also on the agenda.

Dr. David Powell, an epidemiologist at the Gluck Equine Research Center at the University of Kentucky who was steering the inquiry, said that on May 2, when he first visited farms reporting an abortion epidemic, caterpillars "were literally carpeting the fields."

But researchers did not think they were likely culprits.

"All of us could remember the year before. It was a bad tent caterpillar year, too," Henning said. But there hadn't been these appallingly high numbers of foal deaths.

Dr. Tom Tobin, a Gluck toxicologist, suggested feeding a caterpillar to a mouse, but "this thought was not pursued," Tobin said.

Harrison had already tested a few caterpillars for cyanide on May 4; all were negative.

"It threw us off the track," Henning said.

So would the next set of results.

Steve Jackson, an equine nutrition consultant who was working on the investigation, had three pasture samples that beat Henning's to a lab. On May 10, when about 1,000 worried horsemen gathered at Keeneland, Jackson reported



05/20/2001 - Vet nurse Matilda Lee holds the head of a foal while technician Kim Doyle. The foal is from Holly Lane Farm in Lexington, which has lost nine others this spring.

Source: LEXINGTON HERALD-LEADER
Photographer: DAVID STEPHENSON

that early tests found mycotoxins.

But by the following Sunday night, those results were contradicted. No mycotoxins. "Not even detectable," Henning said.

They turned to ergot. But those numbers were all coming in negative, too, he said.

*

On that Tuesday evening, May 15, as Henning and Harrison waited outside yet another meeting on the foal crisis, this one with vets at the Kentucky Horse Park, Henning asked Harrison, "Where are we on this caterpillar business?"

Harrison showed him the book.

It explained how tent caterpillars eat the leaves on wild cherry trees and ingest cyanide.

"He got all excited about what I was able to show him," Harrison said.

The cherry trees, which grow like weeds in the eastern U.S., are the caterpillars' favorite tree.

And the leaves are highly poisonous. When bruised or damaged, they release cyanogenic compounds, to which the caterpillars are immune.

The next day, Henning added cherry trees to his farm questions.

The farm visits were exhaustive, beginning at 5, 4 or even 3 in the morning. "It was really slow, very frustrating," he said. "But I knew that's got to be how we're going to find it."

His colleagues in the agronomy department saw how the search was wearing Henning down.

"They knew -- they could look at me and tell we were really struggling," Henning said. "So they cleared their calendars."

On Wednesday, 10 agronomists hit the farms, asking questions, retracing mares steps, walking fence lines, scouting pastures.

Suddenly, Henning said, it was "cherry tree, cherry tree, cherry tree."

*

The theory faced its first big test the next day, Thursday.

"We had a meeting at 11, and we went around the room to catch everybody up," Henning said. "They came to me, and I said the best prospect was the tent caterpillar."

To say the others were not sold would be an understatement. Scientists are paid to be skeptical.

"Nobody says, 'You're wrong,' but you can tell you're in the minority," Henning said.

Henning was doubtful in the beginning. "We were focusing on the unique and the unusual."

But the unique and unusual had turned in very ordinary results. Mycotoxins were out; so were ergots. Within a few days, the phyto-estrogen theory was dead, too.

"We really had to prove all the others wrong first," Harrison said.

*

On Friday, May 18, Henning and fellow UK agronomist Mike Collins went to a farm where 13 mares in one field had all aborted.

They walked into the pasture, and there it was:

"A huge grove of mature wild cherries, right in the middle of the field," Henning said. "Mike and I looked at each other, and we're getting excited."

The next field had 30 mares and not one abortion.

"No cherry trees," Henning said. That was "the clincher. ... I relaxed a heck of a lot."

*

Veterinarians and breeders were also starting to breathe again. Fewer foals were being born sick, fewer were dying and the mares were losing fewer.

For the researchers, that news fit the caterpillar-cherry tree theory

perfectly. The caterpillars were gone, so the deaths should stop.

Saturday morning, May 19, Henning ran into Tobin, the Gluck toxicologist.

Henning "very much had the black cherry tree hypothesis on his mind," Tobin said. They talked about what Harrison found.

Tobin called Harrison "at once." By 11 a.m., Harrison was walking him through the theory.

On Sunday, Tobin, with Powell (the Gluck epidemiologist) listening in, spoke with the author of *The Tent Caterpillars*, Terry Fitzgerald. Fitzgerald teaches at the State University of New York at Cortland.

"I had the impression it was very important," said Fitzgerald, who hadn't heard about the outbreak of foal deaths.

Within six hours, half of what the caterpillar has eaten has passed straight through its gut, and the other half has been digested, Fitzgerald said.

That explained why Harrison hadn't found any cyanide: empty caterpillars.

"A full-grown caterpillar with a full stomach is carrying a pretty good cyanide load," Fitzgerald told them. "Certainly, what they're pursuing is not impossible."

Young cherry leaves have the most prunasin, the compound that breaks down into cyanide. The drought and the late frost may have wilted the leaves, releasing more cyanide. The warm weather helped the caterpillars along, and with such large numbers they stripped trees and moved out much earlier than normal.

Based on breeding records, the researchers have pinpointed April 16-23 as the time when the caterpillars were on the move.

*

Cyanide inhibits the body's ability to take up and use oxygen. Harrison's lab had found a tell-tale sign: 78 percent of the foals had bacteria that

thrive in low-oxygen environments. Umbilical cords, which should have been providing all the oxygen the foals needed, were infected.

Many of the foals delivered to Harrison's lab had lungs full of fluid.

"They may have been gasping or struggling in utero," Harrison said. "But no one could have detected it."

The foals, blind and helpless, were drowning in their mothers' wombs.

*

Then came the breakthrough, Powell said.

At home Wednesday night, Harrison got an e-mail from the University of Illinois: they had found cyanide in the foal hearts.

Harrison and his lab had been unable to isolate cyanide, so he'd turned to trusted colleagues, sending samples for very sophisticated testing.

That "gave us confidence," Powell said. "Without the information from Dr. Harrison, we would not have gone forward."

After 22 days, with more than 100 scientists attacking the problem for 80 hours a week or more, UK had answers for the horse industry at a meeting at Keeneland that night.

"This should never trouble a horse farm again in North America," Tobin said.

There is still a lot to learn about how the cyanogenic compounds get from the caterpillar's stomach into the horses.

But Powell believes that many of those questions will be answered in the next year.

Pasture and tissue samples have been saved for studies. Harrison's lab had to buy new freezers to store everything.

The next year will be telling in many ways.

The state's thoroughbred industry has lost about 4 percent of the 2001 foal crop, and thousands of foals that would have been born next spring were

aborted -- perhaps 30 percent.

The count at the diagnostic center stands at 529 fetuses or foals less than seven days old, from 49 Kentucky counties and 18 breeds. Other dead foals never got there.

"These are unique, almost bizarre circumstances," Powell said. "A combination of factors had to come into play, and it happened, unfortunately, in April 2001 in Central Kentucky."

*

On Friday morning, life began to get back to normal. David Powell, who lives mysteries but doesn't read them, has time again to watch a rugby match or a horse race.

After 9,484 tests, Lenn Harrison got to go to Pennsylvania for his father's 90th birthday party.

And Jimmy Henning slept through his alarm.

"The first time in three weeks," he said. "I feel relieved. ... In my heart of hearts, I feel it's over."

CAPTION: DAVID STEPHENSON/STAFF

Mares grazed at Taylor Made Farm. Scientists say they now know what was killing foals there and at other farms.

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FOAL LOSS EXCEEDS 5,100, STUDY SAYS

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LEXINGTON HERALD-LEADER

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By Janet Patton, Herald-Leader Business Writer

The economic impact of this spring's epidemic of foal deaths will be about \$336 million through 2003, according to a study released yesterday by Gov. Paul Patton's office.

The study also found that more foals were loss to mare reproductive loss syndrome than previously thought. It found that more than 5,100 foals of six breeds died this spring.

The toughest financial times are in store for this year and next year, according to Richard Thalheimer and Robert Lawrence of the University of Louisville Department of Equine Management, which conducted the study.

Most of the impact -- more than \$300 million -- will fall on the thoroughbred breeding industry around the Bluegrass, the result of lost stud, board, vet, farrier, transport and sale fees.

Each thoroughbred foal was calculated to equal \$85,142 in lost fees.

But other breeds will also be hurt.

Patton said in a news release that the analysis, "will assist the equine industry in making its case for federal assistance." Patton requested the study after horse industry representatives asked for help. State aid seems unlikely with Kentucky facing a projected budget shortfall of a half-billion dollars.

The horse industry is the state's leading agriculture cash crop, with \$1.04 billion in sales last year, according to Kentucky Agricultural Statistics for 2000-2001.

The U of L economists surveyed 1,024 breeders and farms.

They found foal deaths were greater than previously counted.

Of the 2001 crop of all breeds of foals, 1,356 or 9.1 percent died just

before or just after birth.

Of the 2002 crop of all breeds of foals, 3,825 or 25.5 percent were aborted.

* Among thoroughbreds, 516 foals (5.3 percent) of the 2001 crop died; 2,998 foals (30.5 percent) of the 2002 crop were aborted.

* In standardbreds, 150 foals (20.9 percent) of the 2001 crop died; 142 foals (19.8 percent) of the 2002 crop were aborted.

* In quarter horses and paints, 550 foals (22.1 percent) of the 2001 crop died; 409 foals (16.4 percent) of the 2002 crop were aborted.

* In saddlebreds and Tennessee walkers, 140 foals (7.2 percent) died; 276 foals (14.2 percent) were aborted.

The study noted that prices for the remaining yearlings in the 2001 and 2002 crops could increase.

But "additional losses may also occur as a result of the scare over MRLS, which could result in a reduction of mares sent to Kentucky in 2002 or in lower values for mares bred in 2001," the report said. "Should MRLS reoccur in 2002 ... the losses could be much more dramatic over a longer period of time."

David Switzer, executive director of the Kentucky Thoroughbred Association, said the study could be used to bolster a request to fund an "early-warning" system proposed by the University of Kentucky College of Agriculture to protect future foal crops.

The cause of MRLS still has not been determined but abnormal weather patterns have been linked to it, as have wild cherry trees and swarms of Eastern tent caterpillars.

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FOAL DEATH MYSTERY REMAINS, EVEN AS UK SET TO ADVISE FARMS

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By Janet Patton, Herald-Leader Business Writer

SEND: YES

FOAL DEATH MYSTERY REMAINS, EVEN AS UK SET TO ADVISE FARMS

Last spring Kentucky suffered a mysterious environmental disaster of as-yet untold proportions.

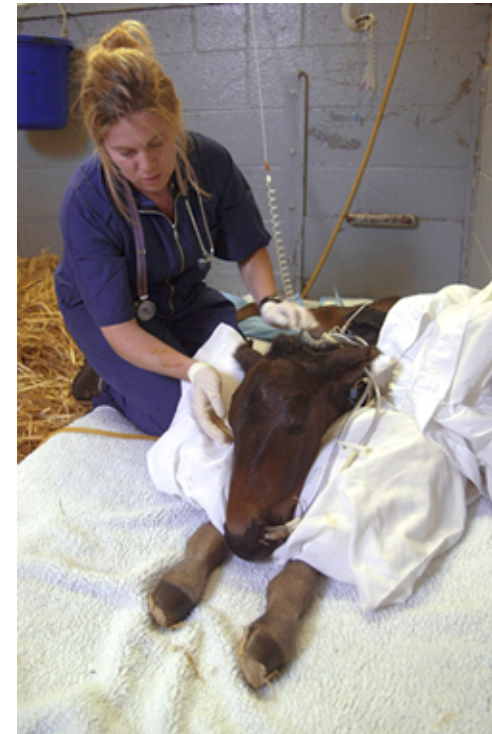
There was no toxic spill, no cleanup and, after five months, there are no answers.

As much as 5 percent of this year's thoroughbred foal crop and 20 percent of next year's crop were lost; harness horses, pleasure horses, draft mules and other breeds were also hit hard.

While Gov. Paul Patton's office is awaiting an economic impact study on the losses, which have been estimated to be as much as \$250 million, the famed horse farms of the Bluegrass are still wondering, what killed our foals ... and will it happen again?

Many farms are beginning to make decisions about what to do with their fields, what to tell their clients, what to do with their mares.

The University of Kentucky is planning to give farms recommendations this week on how to reduce the risk of a recurrence of the epidemic of foal deaths and abortions.



05/20/2001 - "You think, 'God, there's never going to be hope,' and then 24-hours later they are doing much better," said vet nurse Betsy Elsworth. This sick foal had regressed on Tuesday.

Source: LEXINGTON HERALD-LEADER
Photographer: DAVID STEPHENSON

But UK's Gluck Equine Research Center was still figuring out last week exactly what those recommendations should be because scientists have yet to pinpoint the cause of the deaths.

"I think you can't 100 percent say everything's going to be fine," said Duncan Taylor of Taylor Made Farm in Nicholasville, one of the first to report the foal crisis and one of the hardest hit.

"Odds are pretty good that it's not going to happen again ... but we'd feel more comfortable if we knew what caused it."

Cyanide-laced Eastern tent caterpillars, identified by UK scientists in May as the likely cause, remain the prime suspect.

But despite strong circumstantial evidence linking cherry trees, caterpillars and bad weather to the dead foals, the theory has been tough to prove.

"At this point, we don't have a definitive and we're struggling to get any closer to a definitive," said Dr. Doug Byars of Hagyard-Davidson-McGee veterinary clinic, which treated many of the sickest foals.

One thing the scientists are exploring: They might have had the right foal killer, but the wrong murder weapon.

Cyanide and caterpillars

Last spring, nature came together in a "perfect storm" of weird weather and biological disaster. As scientists sorted through cyanide, caterpillars and exotic natural toxins as possible culprits, first one and then the other would look promising. Now, a hybrid of two theories -- the caterpillars and the molds -- has emerged.

At first, scientists were all sure it was mysterious poisonous mycotoxins, sometimes produced by molds.

The symptoms seemed to fit: Reproductive problems, lesions on the eyes, and fluid around the heart have all been linked in humans to exposure to various

mycotoxins, scientists say.

Although some early tests turned up mycotoxins, subsequent tests -- more than 400 of them -- contradicted those results.

What now appear to be false positives earned Steve Jackson, an independent scientist working on the crisis, a nickname among the Gluck group: "Myco" Jackson.

"Poor Steve. I'd still like to prove him right," said Kyle Newman, a nutritional microbiologist who has been doing a lot of the testing out of his start-up, Venture Labs, in UK's campus incubator for small technology-based businesses.

"The forage sampling may simply have been too late," Newman said.

Or, he said, the mycotoxins might not have been in the forage.

Mycotoxins were elbowed into the background by Eastern tent caterpillars as scientists focused on the unusually heavy infestation around Central Kentucky last spring.

Epidemiological survey results continue to put caterpillars and cherry trees in close association with the outbreak, which has been named Mare Reproductive Loss Syndrome.

Researchers theorized that the caterpillars were somehow transferring deadly cyanide compounds from their favorite food, cherry leaves, to the horses. Cyanide was found in the heart muscles of some of the dead foals.

To test the theory, scientists have ground up caterpillars, floated them in water and injected the contents of their guts into mice.

But the scientists have been unable to find some crucial pieces of the biological puzzle that would prove the cyanide theory.

"I've always had a problem with it from the caterpillar side," said UK entomologist Bruce Webb, who has raised caterpillars for about 20 years.

Gluck researchers were able to prove the caterpillars had cyanide in them,

but it doesn't stay there. Caterpillars rapidly detoxify the cherry leaves.

"By mid-gut it's virtually undetectable," Webb said. "The idea that the cyanide passes through somehow has never made much sense to me. If it's cyanide, I don't see how it's caterpillars. If it's caterpillars, I don't see how it's cyanide."

Hybrid theory

The way Newman remembers it, after one of the many meetings on the foal crisis, Webb said to him something like, "I like your mold theory. And, you know, frass is a mold growth medium."

"That's great," Newman said. "What's frass?"

Frass is caterpillar excrement, a rich source of nitrogen and wonderful growing medium for mold. And last spring, after the unusually heavy Eastern tent caterpillar infestation, the ground underneath a lot of Kentucky trees was coated with frass.

It was Newman's idea, Webb said, that the frass could grow the right molds to produce mycotoxins.

"We've done more than talk about it -- we've tested it. ... All of that happens," Webb said. Within 24 hours, molds capable of producing the suspected mycotoxins were growing on plates of caterpillar poop left sitting in pastures.

The timetable fits. By mid-April, caterpillars across the Bluegrass had chewed through a lot of leaves, dumping the remains on the ground. There was a huge mold bloom.

Then, on April 17 and 18, a hard freeze hit.

Scientists know relatively little about mycotoxins, but they think molds produce them under stress. The freezes put all that mold under a lot of stress, and the mold might have released its biological weapon: mycotoxins.

From studying vets' records, the researchers think they know when the

attack came. Whatever killed the foals hit April 19-26.

Few conclusions

To move the theory along, scientists have to find out whether the toxins could get into the horses.

Researchers collected 10 grams of Eastern tent caterpillar excrement in the spring -- filling about a quarter of an ordinary sandwich bag. "That's enough to see if a horse will eat it or avoid it," Webb said.

Karen McDowell, a reproductive physiology expert at Gluck, has tried it out, Webb said, and horses will eat frass.

"Is that a conclusive experiment? No," Webb said.

But conclusions have been hard to come by.

"I would not want to jump to making this the favored theory yet," Webb said. "But we haven't got the critical piece of the cyanide theory either."

Next

"I still believe what we had was a mycotoxin problem," Newman said. "If that's the case, we may start to see (the toxins) again soon."

Kentucky has a "mold season" in the spring and again in the fall. Traditionally, fall is worse as leaves and grasses decay.

Newman and the others are watching carefully for signs of a second wave, perhaps of mares bred in August for the Southern Hemisphere.

A pair of entrepreneurs -- a Minnesota scientist and a California horseman -- think the fall bloom could hit a lot of mares hard.

Pat Williams and Jack Saip of Equine Testing Systems think they have found a way to guess at mycotoxin exposure by looking for mold antibodies in the mares' blood.

The methods are adapted from those used to check for human exposure, Williams said. And treatments might be modeled on those as well, using drugs that boost the immune system.

They plan to pitch their services to farms this week. Preliminary work on six local farms has found elevated levels of mold antibodies in mares that aborted, Williams said.

Meanwhile, UK is planning to release recommendations to Kentucky horse farms on how to prevent this from happening again, and what to watch for.

College of Agriculture dean Scott Smith will meet with farm managers Tuesday evening.

Dan Rosenberg, president of Three Chimneys Farm near Midway, will be there. Three Chimneys put together a task force to address these questions, and the farm has been waiting on those answers to make final plans.

Rosenberg said reassuring people, including mare owners, is important, but the panic has long passed. "I don't see (the potential recurrence of MRLS) as a huge crisis," Rosenberg said. "There are basic things we can adopt to reassure mare owners.

"We'll be looking at organizing our farm so that mares who get pregnant early will not be in places that have high populations of cherry trees. If we see the weather pattern recurring, we can limit their exposure to pasture."

Smith is also scheduled to release a report this fall on all of the "work in progress," everything from cyanide to mycotoxins to all the other avenues of exploration, and all the blind alleys.

The prime theory is still cyanide.

"You don't have any other test in any other area that points to a specific toxin," Newman said.

"If it were easy, we would have found it by now."

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