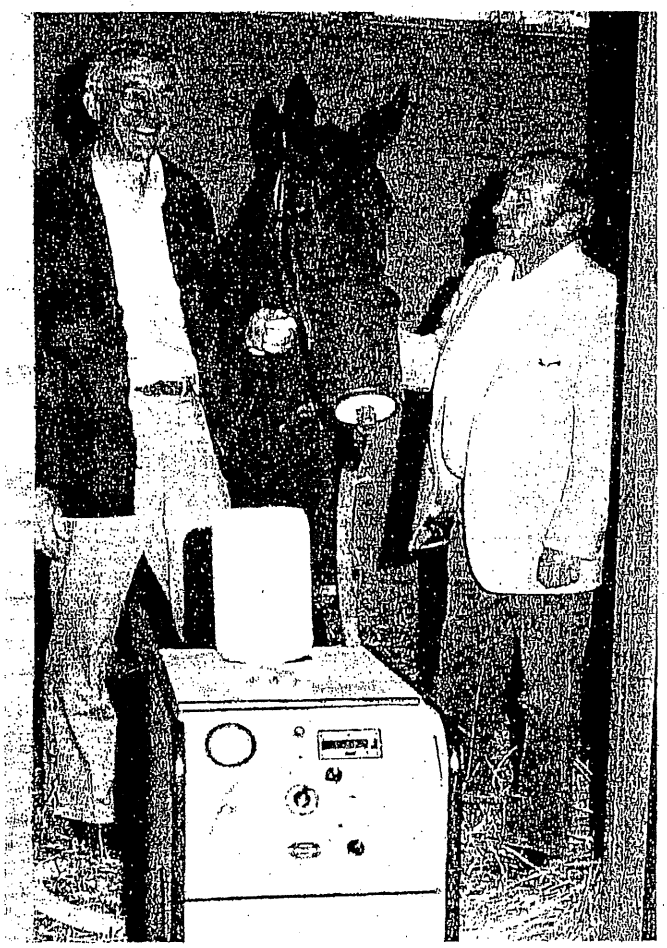

New Hope For Horses With Breathing and Bleeding Problems

Transpirator Could Alleviate Common Ailments

BY BILL HELLER

"I was living to run
And running to live
Never worrying about pain."
—Bob Seger
"Against The Wind"

Richard Blackmer *(left), Chairman of Oxygen Enrichment Company, treats* **Oil Painting**, *the first horse in the EIPH Study, as* **Jack Lake** *(right), Chairman of Saratoga Standardbreds, Inc, observes the procedure.*

Unfamiliar with horse racing, Richard Blackmer stepped into a billion dollar industry lacking knowledge. The flip side is that he also lacked the stereotypes, conceptions, misconceptions and traditional approaches to dealing with the haunting reality affecting 50 to 80 percent of all racehorses.

They bleed.

Some—and others who don't bleed—have breathing problems.

Blackmer, a wiry, 6-foot-6-inch, 56-year-old scientist from Klamath Falls, Ore., has invented an air humidification machine, the Equine Transpirator, and a high-humidity treatment which helps both.

The machine's predecessor, Blackmer's high-humidity, oxygen enrichment machine, has demonstrated a capability of improving physical therapy for human patients with cystic fibrosis, a fatal disease which is the nation's No. 1 genetic killer of children and young adults. One of every 20 Americans is a carrier of cystic fibrosis.

The Equine Transpirator has already produced remarkable results, alleviating bleeding and/or breathing problems with a limited number of standardbreds and thoroughbreds and a World Champion Arabian.

"It's a totally new concept in terms of attacking what is one of the favorite theories about the genesis of bleeding," Dr. James Belden, a noted thoroughbred veterinarian, said from his office near Belmont Park on Long Island.

Another veterinarian, Dr. Jack Foster Harris of Bensalem, Pa., said, "I'm very excited about it personally. The machine has a place in racing, definitely. It cleans the mucous out of the lungs."

Dr. Lawrence Soma, one of the nation's leading authorities on equine bleeding, and Harris, who has treated thoroughbreds for 20 years, were involved in a study of the Transpirator on 13 thoroughbreds and one Arabian at Delaware Park this summer.

Twelve of the 14 horses were bleeders being treated with Lasix, the trademark name of the controversial furosemide, a potent diuretic used by injection as a medication for bleeders.

Harris said, "We had seven to 10 horses I was involved with. The machine improved them in every case. Several times, we had phenomenal results. Some of them stopped bleeding completely."

Soma, who works at the University of Pennsylvania's New Bolton Center, said in September, "We haven't analyzed the data. It looks like it does good things. I don't think it's going to be a panacea, but it helps a certain number of horses. It certainly looks promising."

Use of Lasix on this year's Kentucky Derby winner, Spend A Buck, has rekindled debate about the merits, effectiveness and morality of the drug.

Currently, 20 of 23 states with thoroughbred racing allow the use of Lasix. In harness racing 10 of 16 states permit its use.

Belden said he favors the controlled use of medication: "It's simply unfair to ask a horse to perform when we're able to help him."

He added, however, "If this thing (the Transpirator) eliminates the need for Lasix, it would be a great development."

Blackmer said, "Our research tells us Lasix doesn't do diddly."

Belden—and to a lesser extent, Dr. William Reed—were aware of experimental use of the Transpirator on problem thoroughbreds in New York, which allows no medication in a horse 48 hours before a race.

Belden said he was aware of 14 thoroughbreds who were treated confidentially. Belden told *Hoof Beats*: "In two cases, I've had dramatic results with it. One horse had a chronic breathing problem. The other had an allergic problem, a low-grade allergy to dust. They cleaned that horse up very nicely. Another six or seven horses, it's helped significantly in terms of their performance and the diminution of post-exercise hemorrhaging. It has helped."

Reed said, "Frankly, I have no opinion. They

asked me to provide them with a horse or two. I have no concrete information. In theory, it sounds like it may work. It may help some horses. I don't think there's any way it hurts a horse. The horses seem to enjoy it. They don't move around. They seemed to be pleased with the treatment."

Blackmer worked for General Electric in Schenectady, N.Y., for 25 years, conducting membrane technology research in fields as diverse as deep-sea diving and the Gemini Space Program. In 1976, he and Jon Hedman, now executive vice president, began the Oxygen Enrichment Company (OECO), working for years to perfect the Transpirator.

Human beings, not horses, were Blackmer's initial concern.

"The theory is basically humidic," Blackmer said. "We're using pure water vapor, completely filtered. When we got into horse racing, which was only February, I had never heard of equine exercise induced pulmonary bleeding. (EIPH, exercise induced pulmonary hemorrhage, is the common term.) It doesn't happen in people. It hurts so much, you quit."

Humans with cystic fibrosis have no choice. Although there is no cure for the disease, the average life expectancy of a child with cystic fibrosis has increased from 10 years to 21 through research the last decade.

Cystic fibrosis slowly takes over a child's body by not allowing the normal production of free-flowing secretions which remove mucous and bacteria. The secretions are produced by exocrine glands and are vital to bodily functions such as breathing and digestion. Cystic fibrosis victims produce abnormally thick secretions which allow mucous to accumulate in various parts of the body, particularly the lungs and intestines.

The common therapy, one repeated twice daily, is technically called chest physiotherapy. Actually, it is whacking: doctors or therapists or parents literally whacking a child's chest to free mucous trapped in the lungs.

Blackmer's high-humidity, oxygen enrichment machine facilitates the removal of mucous-filled secretions. "Our humidity therapy is still experimental with cystic fibrosis people," Blackmer said. "We invented a high-humidity membrane oxygen machine. The Transpirator is the outgrowth of that. We can take a cystic fibrosis kid who has been supposedly cleaned out (by whacking), put him on the machine half an hour and double the weight of secretions he'll cough out."

The effectiveness of the machine with cystic fibrosis patients is already documented from research conducted at the James Whitcomb Riley Hospital for Children in Indianapolis. Dr. Howard Eigan, who participated in the study, said, "We found that patients on the machine had somewhat better lung function and certainly said they felt better."

Further research is ongoing at the University of Miami's Mailman Clinic in Miami, Fla., and the Rainbow Babies Hospital in Cleveland.

Dr. Robert McKey of the Mailman Clinic told *Hoof Beats*: "From our trials over the past six months, cystic fibrosis patients are convinced it's helpful. We're impressed enough that we're going to do a formal study."

Elena Martinez, a therapist at the Mailman Clinic, said, "OECO is a very interesting piece of equipment that is helping tremendously in keeping the secretions loose so it will be easier to expectorate them. My patients tell me they find it a lot easier to breathe and to receive therapy after sleeping in this high-humidity environment."

Trainers who have seen the Transpirator work on their horses have used the machine on themselves. Carl LaBombard trains horses for Jack Lake's Saratoga Standardbreds Inc., a public company Lake created in 1981. Lake first experimented with the equine version of the machine on his own horses and has since invested substantially in OECO. LaBombard, who trains horses at The Meadowlands, Garden State and Saratoga Raceway, said, "I'll tell you one thing. It (the Transpirator) works. Any horse with a respiratory problem, with any lung problem, it works. It cleans their lungs out. With bleeders, it's amazing. The horses love it. They look forward to it. It doesn't surprise me. You know yourself . . . if you have sinus trouble. It cleaned me right out in 10 minutes. The machine I got at Garden State, guys come around and use it on themselves. And their horses. Now, everybody is using the machine. When they start selling them, I'll be the first on the list."

He may have to fight to get at the head of the line. Cheri Norton operates a machine for Saratoga Standardbreds Inc. at Saratoga Raceway (formerly known as Saratoga Harness). In three weeks, she said she was deluged with customers bringing their horses for treatments, which are usually administered for an hour and a half to two hours daily, five days or more before a horse races. "I'm treating be tween 10 to 12 a day," Norton said. "They'r all coming to me. I'm not soliciting them. I wa at The Meadowlands for a month in July. I wa treating eight horses. All eight were bleeder None were on Lasix. I'd say six of them im proved. Two stopped bleeding completely."

With demand, both equine and human, mu tiplying rapidly, OECO is planning mass pr duction of the Transpirator. "We're going t produce Equine Transpirators in mass, Jan ary first, in Schenectady," OECO President Joh Finley said. "Right now, we're going to be mal ing between 1,000 and 2,000 units initially."

Although a price hasn't been set yet, Blacl mer said the machine will likely sell for be tween $4,000 and $5,000.

Blackmer said he thinks there may be grea er demand to help bleeders in standardbre racing than thoroughbred because he believ harness horses inherently bleed more frequen ly than thoroughbreds.

Dr. James Manning, a veterinarian in Sa atoga Springs who treats both standardbre and thoroughbreds, supported Blackmer's co tention based on the nature of the two sport in harness racing, a driver controls the rei from behind the horse; in thoroughbred racin a jockey has the reins and is sitting atop th horse.

"There are some problems with standar breds that thoroughbreds don't have," Ma ning said. "The driver sits behind the horse ar has a lot of leverage. Many horses are pulle and the driver has to pull the reins . . . at th gate or sitting in a hole. The driver can actual close off the horse's breathing through the thro Many times, it causes bleeding at the thro because they're being choked. Sometimes, even happens in warm-ups. In the worst case the horses choke down. That doesn't happ

RESULTS OF BRONCHOSCOPIC EXAMINATIONS OF 34 KNOWN BLEEDERS AFTER 60 TRANSPIRATOR-TREATED RACES

LOCATION	NUMBER OF HORSES STUDIED	NO BLEEDING	LESS SEVERE BLEEDING	UNCHANGED BLEEDING
TRANSPIRATOR WITHOUT LASIX:				
SARATOGA MEADOWLANDS GARDEN STATE (Harness)	10	4	4	2
BLUE BONNETS (Harness)	4	3	1	0
SARATOGA (Thoroughbred)	12	7	3	2
DELAWARE PARK (Thoroughbred)	2	0	2	0
TOTAL	28	14	10	4
PERCENTAGE	100%	50%	36%	14%
TRANSPIRATOR WITH LASIX				
DELAWARE PARK (Thoroughbred)	6	2	2	2
PERCENTAGE	100%	33%	33%	33%

th thoroughbreds."

Blackmer, though, began research with his Equine Transpirator with thoroughbreds. Blackmer offered a simple explanation: he was able to find more veterinarians willing to conduct post-race throat scopes following afternoon thoroughbred racing than traditional night harness racing.

Scoping was essential to Blackmer's research. Until the early '70s, bleeding was believed to be an infrequent problem in horses with diagnosis of bleeding made solely from the appearance of blood at a horse's nostrils.

Equine technology drastically improved with the invention of the flexible fiberoptic endoscope, a diagnostic instrument allowing examination of a horse's respiratory tract. Use of the flexible endoscope allowed veterinarians to conclude the lungs, not the nasal cavity, was the source of a horse's bleeding and, according to *The Blood-Horse Magazine*, horses who bleed from the nostril represent "only a very small percentage" of the number of horses who bleed.

Subsequent research has indicated 50 to 80 percent of all racehorses bleed.

Blackmer's 25-year experience with membrane technology research led him to his own conclusions about bleeding and breathing problems in horses, although he did not go to a racetrack for the first time in his life until last March.

"We can't make the horse better than he is, but we can remove the impediments that prevent him from getting his full oxigenation," Blackmer said. Blackmer said the impediments can range from the naturally poor-ventilated environment of racehorses to bleeding problems.

"Every horse is in a barn with dust, fungus, pollen and pollution," Blackmer said.

Ever know a trainer or groom who smokes cigarettes? This, too, can worsen the horse's breathing environment.

"Any horse anywhere is susceptible to a bad environment, especially if they're kept in their stall all the time," LaBombard said.

LaBombard said the environment at The Meadowlands is especially bad, hardly a revelation if you've driven through that factory-laden part of New Jersey. "At The Meadowlands, the area is all factories, paint factories," LaBombard said. "The air isn't that good. There's smog. It gets in their lungs. Some days, all you breathe is paint."

Blackmer explained the connection he perceives between healthy breathing and bleeding. "In normal breathing during maximum exercise, the lung expands to six times its size," Blackmer said. "In people and horses, it's about the same. In a clean lung, during normal breathing, negative air pressure reaches 60 millimeters. The negative air pressure may exceed 80 in a horse. This negative air pressure in combination with positive blood pressure is the most likely cause of bleeding. From deep sea diving experience, we know that.

"The capillaries in the aveoli (tiny air sacs in the lungs) rupture when negative air pressure becomes greater than 80 millimeters.

"The first kind of bleeding is painless. The blood comes out of the aveoli and is carried into the air passage of the lung. It's swept up by normal mucous to the trachea and then is swallowed. That is why many bleeders aren't discovered.

"As the horse is fully ventilating (when he's racing, for example), air can't get into some of the aveoli because they're blocked by mucous. Then, air goes into whatever aveoli that are open. Those aveoli get over-expanded and stretched. If those rip, that will be painful.

"What we do with the Transpirator is accelerate the removal of mucous and debris from the bronchials, tiny passages to the aveoli."

The theory made sense to Lake, who had built Saratoga Standardbreds Inc., a 247-acre farm in Ballston Spa, five miles south of Saratoga Raceway.

Lake has always had a bit of pioneer in him. He framed his farm with his company's own fencing, polyvinyl chloride, a durable plastic.

Saratoga Standardbreds Inc. was incorporated in January of 1981 and went public in September, 1984. Lake first tried the Transpirator on one of his horses five months later.

I'm in favor of this therapy because it's totally noninvasive. It doesn't invade the body with drugs or aftereffects.

"In February, I had a mare racing at Roosevelt, Oil Painting," Lake said. "She had finished distanced three times. She was bleeding.

"I had heard about this treatment, high-humidity vapor treatment used on kids with cystic fibrosis. We got them to make a horse version of the machine.

"We brought Oil Painting back to our farm. She was done racing until we put her on the machine."

According to LaBombard, "Oil Painting was racing in 2:03 at Saratoga. Her last three starts, she paced between 1:56.2 and 1:56.3 (at The Meadowlands' mile-track, two to three seconds faster than Saratoga's half-mile oval)."

Oil Painting wasn't the only success story with the machine for Lake and LaBombard. Sunbright, a trotting mare who once defeated Hambletonian winner Duenna, had a (previous) record of 1:59.4 and won in 1:57, according to Lake.

LaBombard said, "Both Oil Painting and Sunbright were bleeders. Both stopped bleeding. Sunbright bled just a little before the treatments. She stopped bleeding in two days. Oil Painting stopped in two weeks."

Lake, a chronic smoker, started using the machine on himself. "There is a great future for this machine," he said. "It works, brother, I'll tell you that."

Blackmer has patents pending for the oxygen enrichment machine and the Equine Transpirator, and a method patent pending for high high-humidity treatment.

Since the Transpirator incorporates no medicine, there seem to be no legal roadblocks to prevent its usage. "I should think there aren't any legal problems," Dr. Belden said. "I'm in favor of this therapy because it's totally noninvasive. It doesn't invade the body with drugs or aftereffects."

Norton said, "There's totally no medication involved. It's distilled water. How illegal can it be?"

"How effective can it be?" was the initial question confronting Blackmer. He chose to begin his research in Delaware, which allows Lasix for thoroughbred racing but not for harness racing.

To corroborate their findings, Blackmer, Joe Alexander, and former harness racing trainer Kevin Verdon, from Saratoga Standardbreds, worked with the New Bolton Center and Dr. Soma as they conducted research with the Transpirator. Dr. Harris was also closely involved.

Lake's son, Mark, who works for Saratoga Standardbreds, reported the following results at Delaware Park:

1) Fourteen horses were treated. Eleven of them were scoped a total of 12 times after races with the examinations revealing less bleeding nine times, no change twice and more bleeding once.

2) More than half of the 14 horses were bleeders being treated with Lasix.

3) Three of the 14 ran their fastest time ever.

4) According to the horses' trainers, 13 horses ran a total of 22 races following treatments. (One horse did not race within a week following treatments.) Trainers then rated performances as "improved," "unchanged" or "worse." Performances were rated improved 15 times, unchanged three times and worse four times.

The study began June 27 on a $3,500 claimer named Whistling In Maryland. The 5-year-old gelding was a bleeder trained by Don DeNenno.

Whistling In Maryland got his first treatment four days before a race. In that race, Whistling In Maryland lost a $3,500 claimer at a mile and a sixteenth. However, he raced the first three-quarters of a mile in 1:11.2. According to DeNenno, Whistling In Maryland's previous fastest time for six furlongs was 1:14.

DeNenno moved Whistling In Maryland up to $5,000 claimers. Whistling In Maryland won in 1:10.3, having received five treatments on the Transpirator.

Whistling In Maryland did not bleed after the race and was moved up to $8,000 claimers.

Dr. Harris said, "Whistling In Maryland couldn't win for $3,500. He had been bleeding through the maximum dose of Lasix. The last time he raced (in August), he raced for $8,000

and did not bleed. He didn't win, but he was competitive. We scoped him every time after he raced. He had four or five treatments with the machine. He didn't bleed for five days after the first race on the machine.

"It was the first time this horse had run when he could breathe properly. He did not bleed. I was surprised, pleasantly surprised."

Harris offered an explanation of the Transpirator's effectiveness: "The heat alone will dilate the bronchials. Moisture seems to liquify the mucous blocks. Then the ciliary action of the lungs will clean them out. It also seems to increase the ciliary action. (Cilia are the microscopic hairs in the bronchials.)

Whistling In Maryland's improvement didn't go unnoticed.

Trainer Darrell Thomas' barn is across from DeNenno's. Thomas, interviewed by phone from his ranch in Nevada, said he trains 27 thoroughbreds and Arabians. In 1984, the Thomas-trained By Golly was named International Arabian Horse of the Year. This past summer, though, By Golly couldn't shake a virus which had passed through Thomas' barn. On June 23, By Golly finished seventh by 17 lengths, eliciting this stretch call from the race announcer, "By Golly looks like he's through."

Thomas, literally a doubting Thomas, decided to try the Transpirator.

"I was a little skeptical about the machine at first," he said. "At the racetrack, everybody and his dog has a miracle cure.

"I saw what the machine did for Whistling In Maryland. What it did for him was unbelievable. He was running back in the field. Then, with the machine, he was running faster than stake horses ran on the same day. And he stopped bleeding. There was no medicine involved. That really interested me."

Thomas characterized By Golly's problems as "a situation with the flu. It just knocked him in the creek. We couldn't clear his lungs. After we used the machine, he won. He didn't seem to have any respiratory problems at all."

By Golly's victory followed two treatments with the Transpirator. By Golly won his following start, too, but hit himself while running, injuring a sesamoid and forcing Thomas to retire him.

Thomas also tried the Transpirator on one of his thoroughbreds. "He improved his performance from seventh to fourth, but he had problems getting out of the gate," Thomas said. "We only used the machine briefly on him. I don't think it was a fair test. As far as breathing, it seemed to bring him right around. He wasn't laboring in his breathing.

"I was definitely impressed by the machine. I'll be the first to buy one."

Could the Transpirator eliminate the need for Lasix? Not surprisingly, the question drew a wide range of answers.

Discussing the potential of the Transpirator versus the highly-debated efficiency of Lasix entails an understanding of why racehorses bleed. Here we encounter a major roadblock.

Although bleeding in horses has been observed for nearly four centuries, it wasn't until the last decade that veterinarians concluded bleeding originated in a horse's lungs rather than the nasal cavity. The invention of the flexible endoscope permitted veterinarians to pinpoint the source of the bleeding but has done little to date to answer the question, "Why do they bleed?"

Dr. Reed said, "We don't know why a horse bleeds. Nobody does, if he's honest. Nobody can explain why a racehorse bleeds and a human being doesn't, why a greyhound racing dog doesn't."

Dr. Soma, who has conducted several studies of bleeders at the New Bolton Center, answered by saying, "I don't know. It's a complicated mechanism."

According to Dr. John Pascoe, who examined 235 racing thoroughbreds in a 1978 study of EIPH (exercise induced pulmonary hemorrhage), there are two basic theories explaining bleeding: one involving the cardiovascular system and one involving the respiratory system.

In an enlightening series of articles about Lasix, *The Blood-Horse Magazine* quoted Pascoe as favoring the respiratory theory, which says bleeding is caused by mucous obstructing the aveoli in the lungs, a theory harmonious with Blackmer's. Pascoe said in *The Blood-Horse* of Aug. 17, 1985, the respiratory theory "seems to be the more tenable of the hypotheses at the moment, but we really don't have enough evidence to support either one of them strongly."

Similarly, there is no evidence to determine definitively the effectiveness of Lasix, which has been used in American horse racing for nearly two decades.

In a 1977 paper in *The Journal of Equine Medicine and Surgery*, Drs. George Maylin, Thomas Tobin, Albert Gabel and Richard Ray summarized their observations of the effects of furosemide injected into a horse's body:

1) Injectable furosemide is a potent, effective and safe diuretic.

2) The furosemide at the usual dose has its peak diuretic effect in about 20 minutes, in which time a horse's urine output is increased up to 40 times.

3) Most of the diuretic effect is within the first two hours of injection.

4) The furosemide reduces edema (excessive accumulation of fluid in tissue) in the lungs and airways of horses with certain respiratory diseases.

Many studies have been done in recent years to measure the effectiveness of Lasix. One study was conducted with standardbreds through the University of Kentucky by Dr. Tobin, Dr. T. W. Swerczek, Dr. Brian Roberts and Mark Crisman. According to *The Blood-Horse*, time trials conducted over Lexington's Red Mile showed "no significant changes" in performances of horses treated intraveneously with .55 milligrams of furosemide per kilogram of body weight administered 30 minutes prior to the time trials. *The Blood-Horse* also said that a study of 58 standardbreds running with and without furosemide at Louisville Downs showed "no signi. icant difference between times."

Of three studies of Lasix with thorough breds:

1) A study of 61 horses with EIPH by th New Bolton Center showed 70.8 percent stil bled after treatment, leading to the conclusio furosemide was not "statistically significant i reduction of the prevalence of EIPH."

2) A study of 29 bleeders training at South ern California racetracks showed furosemid reduced bleeding in 28 of the 29 but "did no stop bleeding in a majority of the horses."

3) A study of 128 horses with EIPH by Dr Soma and others at five racetracks revealed th administration of furosemide "neither pro duces an improvement nor return to previou performance level in all cases, nor does EIPH affect all horses uniformly."

All of the studies cited were from the Lasi series of articles in *The Blood-Horse*.

Soma told *Hoof Beats*: "Lasix works in a certain percentage of horses." In a televised interview Sept. 5 on ESPN's racing show, "Down The Stretch," Soma said that percentage was 50 to 60. Asked if Lasix should be used currently, Soma told *Hoof Beats*: "Yes, until something better comes along."

Critics of Lasix maintain its diuretic aspects can flush other drugs out of a horse's system, thus masking illegal drugs. Critics are also concerned with the side effects of Lasix.

American Hoechst Corporation, which sells Lasix, warns that furosemide, if given in excessive amounts, can lead to excessive diuresis which could result in dehydration, reduction of blood plasma volume and electrolyte imbalance.

Lee said Lasix "takes everything out of horses. It dehydrates them."

Blackmer said Lasix doesn't prevent hemorrhaging. "It prevents it from being detected," he said. "It makes the blood thicker because it lowers the water content. What it does is eliminate water from the system. Two things happen: 1) it reduces a horse's weight by as much as 20 pounds, and 2) it packs the blood. It reduces the liquid in blood cells. Each blood cell has more oxygen-carrying capacity. These are transitory results which may be interpreted as Lasix decreasing bleeding. With less fluid, if there is a hemorrhage, it may coagulate quicker. The blood doesn't get blown out of the nose, but it does reach the trachea. Then, they swallow it.

"We're finding eight out of 10 horses bleed through Lasix."

Dr. Harris said he doesn't see the Transpirator eliminating the need for Lasix: "No, I don't feel that. In some cases, it will. In general, I don't think so. But we can reduce the dosage."

In the state of New York, Lasix—as well as any other medication—is prohibited 48 hours before thoroughbred or standardbred races. Since admission that a horse is a bleeder in New York could have legal and severe economic ramifications (some horsemen believe bleeding problems are hereditary and can be passed

in breeding), confidentiality was maintained while Alexander and Verdon experimentally treated several thoroughbreds during the summer meeting at Saratoga and the ensuing fall season at Belmont Park.

Hoof Beats, however, was permitted to witness a demonstration of the machine and observe the results of treatment of several horses. To maintain confidentiality, references to these horses will be purposely vague.

The Saratoga Equine Transpirator is Blackmer's ninth clinical prototype. The machine is one foot wide, 3½ feet long and 2½ feet high, a white box mounted on wheels with a long vacuum hose Blackmer calls the heated delivery tube. The machine weighs 120 pounds. "The bug they have to work out is the size," LaBombard said. "It's a little bulky to move."

The Transpirator has the following dials on its front panel: flow valve, digital temperature readout, HDT (heated delivery tube) power and power switch.

"It runs on electricity and distilled water and puts out highly filtered, heated and humidified air with no water particles," Blackmer said. "These are bacteria carriers. This is pure water vapor."

Assisting Blackmer on a sunny, summer afternoon is Verdon, who trained harness horses for 12 years. "I never thought high-strung thoroughbreds would stand for the machine," Verdon said. "They all love it. This horse loves it."

This horse, Horse A, is a 4-year-old bleeder who had finished a tiring eighth in his last start the day before this day's treatment.

A yellow bucket, a mask at the end of the heated delivery tube, is strapped onto the horse's nose. The horse stands dead still, doesn't even move his head.

Horse A continues to remain still, not flinching an inch while Verdon connects the bucket to the tube and turns the machine on. The horse remains placid though he looks ridiculous: an equine astronaut, perhaps.

In just a couple of minutes, the horse's ears sag.

In 20 minutes, approximately one-fifth the time of a routine treatment, the mask is removed. Already, the inside of the mask is spotted with dirt which presumably had been in the horse's respiratory system.

Blackmer explained the mechanics of the Transpirator: "Transpiration is changing liquid water to vapor through a membrane. Transpirator is a brand name not in the dictionary. The machine filters air through a pretty high-grade inlet filter. The air is then run into a transpiration device. The air is delivered to a heated, partially-insulated, flexible plastic tube to a nasal muzzle mask. A thermocouple in the tube determines the temperature. What we're doing is cleaning out mucous. In polite society, it's called pulmonary hygiene."

Blackmer preferred not to reveal the material of the membrane.

Horse A raced two weeks later in an easier spot than his previous start. After breaking next to last in a large field in a sprint, Horse A was blocked, taken wide on the turn and rallied strongly to finish in the money, beaten by a quarter of a length. Approximately three weeks later, Horse A raced in similar company, finished a close second and did not bleed afterwards, according to Blackmer.

The results with Horse B were more startling. In his last start before the treatment, Horse B had been fourth in a sprint. He had not won in several previous starts. In his first race after treatment three and a half weeks later, Horse B won in the same class at the same distance by several lengths. He improved his time 3⅘ seconds, the equivalent of 17 lengths. Horse B was then moved up in class and finished second by less than a length. He then won his next start.

Horse C won a top stakes race after being treated.

Horse D won two straight claiming races.

Horse E was raced on only two days of treatment, lost and bled profusely afterwards.

Blackmer said, "We have treated over 60 horses so far and observed 100 races (into September). Seventy-five percent have statistically significant results, maybe higher."

By mid-September, OECO had refined the Transpirator for mass production. The 11th engineering prototype is smaller (one foot wide, 20 inches long, 1½ feet high), lighter (40 pounds) and easier to operate than the ninth prototype demonstrated for *Hoof Beats*. The front panel of the new Transpirator® has a tube indicating water level and two switches labeled on/off and drain valve. The machine operates on 115 volts.

Obviously, Blackmer's machine demands more research. Some research is ongoing in the lag time between deadline and publication of this article.

In August, the Grayson Foundation approved funding for a research study with thoroughbreds by Murli Manohar of the University of Illinois to study the effects of Lasix on the heart and lungs of bleeders.

Dr. Reed said he doesn't think the Transpirator will revolutionize horse racing. He and many others, however, aren't ruling out the possibility the machine will continue to help horses with bleeding and/or breathing problems.

"It's hard to get anyone to experiment," Lake said.

One thing is certain about the Transpirator: Lake and Blackmer will never run out of potential equine patients.

"I really don't know why horses bleed," Dr. Harris said. "We just know they bleed. And there's a lot of them." ■