The eye of the Boxer, above left, shows vascularization from ulcers that cause inflammation of the cornea. After treatment with grid keratotomy surgery, a procedure that makes a lattice of fine scratches in the cornea to expose the healthy stroma for the epithelium to adhere to, the ulcer heals and the cloudy vision begins to clear, as shown in the eye above right.

What Are ‘Boxer Ulcers’?

Called “Boxer ulcers” because of their frequency in the breed, spontaneous chronic corneal epithelial defects are essentially indolent or non-healing corneal ulcers. The condition occurs when the epithelium, the clear layer that protects the front of the eye, no longer adheres to the underlying tissue. Unlike scratches or other injuries that damage the epithelial layer of the cornea and heal in three to five days, Boxer ulcers may persist for weeks to months, even with treatment, and often require surgery. Bacterial infections can complicate this eye disease.

“Indolent ulcers are the most common eye problem in Boxers,” says Keith Montgomery, D.V.M., DACVO, assistant professor of ophthalmology at North Carolina State University College of Veterinary Medicine. “We believe it is an inherited condition that has increased in the breed partly because it is an adult-onset disease. Dogs are often selected for breeding before they are diagnosed with the disorder.”

Montgomery is the lead investigator of a two-year study funded by the AKC Canine Health Foundation to identify the inheritance pattern of SCCED in Boxers. The research involves using a genome-wide approach to identify a chromosomal region likely to contain markers of the disease genes. Comparing the DNA of 50 affected Boxers and 50 normal, older Boxers, the researchers hope to identify the causative mutation and develop a genetic test to reduce disease prevalence via selective breeding practices.

“We are building a pedigree of a Boxer line in which indolent ulcers are present in three to four consecutive generations,” Montgomery says. “Information from the littermates of affected dogs will help us to determine whether SCCED has a dominant or recessive mode of inheritance.”

An Abnormal Corneal Attachment

Painful red, squinting eyes are a sign of Boxer ulcers. The redness is seen in the conjunctiva, or the white of the eye, and tearing is common as well. A veterinarian can differentiate the condition from a scratched cornea using fluorescein staining, a process that involves applying a fluorescent green nontoxic dye to the surface of the cornea and then carefully examining the eye.

Owners generally assume a dog’s red eyes are due to eyelashes, hairs or debris getting into the eye or from being scratched by the family cat. “We rule out other causes based on the shape of the ulcer,” Montgomery explains. “An ulcer is typically not linear or pinpointed as a scratch or puncture would be. Most importantly, the epithelium surrounding the ulcer debrides or rubs off easily, which tells us the attachment between the epithelium and anterior stroma is abnormal.”

Multiple indolent ulcers may occur. “Anywhere from 10 to 50 percent of dogs can have multiple ulcers that may occur in the same eye or both eyes,” Montgomery says. “About 25 percent of the Boxers in my study have had ulcers in both eyes.” SCCED occurs in people as well as dogs. Besides Boxers, other breeds affected include Pembroke Welsh Corgis, Samoyeds and Staffordshire Bull Terriers. The disorder was recognized in Boxers nearly 40 years ago.

An Individual Approach to Treatment

Sally Dale of Hamiota, Manitoba, Canada, who breeds under the Bendí prefix, has experienced SCCED in her own Boxers and has submitted DNA from her bloodstream to support the corneal ulcer research. Initially, when her 5-year-old female, Bendí’s I Think I’m Hot (“Jewel”), began squinting, Dale thought the dog had barley shafts in her eye from running through a field. After multiple treatments, Jewel is slowly regaining her vision.

When Jewel began squinting, Dale tried using an antibiotic eye ointment. When this didn’t help, Dale took Jewel to the veterinarian who diagnosed...
indolent corneal ulcers in both eyes. The veterinarian used cotton swabs to gently remove the damaged loose epithelium that would not adhere to the stroma.

Successful treatment of Boxer ulcers may involve surgery. Treatment is based on the severity of the case and whether bacterial infection has developed. In Jewel's case, her eyes did not improve, so three weeks later her veterinarian used a surgical needle to make superficial scratches in the cornea to expose underlying, healthy stroma for the epithelium to adhere to. The procedure is effective in about 80 percent of cases.

Among the types of keratotomies, a grid procedure entails making a lattice of fine scratches in the cornea. A multiple punctuate procedure involves making a series of tiny punctures in the cornea. "Grid keratotomy makes scratches in an abnormal hydraulicized membrane that forms in the anterior stroma and exposes the underlying healthy stroma to which the epithelium can adhere," Montgomery says. "This allows the cornea to heal." Unfortunately, in Jewel's case, the keratotomy did not correct the ulcers. Due to a bacterial infection, which is not a common complication, Jewel developed large divots where the ulcers were. About a month after the keratotomy, Jewel received a superficial keratectomy using a surgical needle to make superficial scratches in the cornea to expose underlying, healthy stroma for the epithelium to adhere to. The procedure is effective in about 80 percent of cases.

The procedure may leave corneal scarring, it has a 100-percent success rate. During the keratectomy, Jewel received tissue grafts from her conjunctiva, the thin membrane that covers the inner surface of the eyelid and the white of the eyeball, to protect and nourish the damaged area of the cornea.

Several months later, "Jewel's eyesight is slowly returning," Dale says. "She can see in areas around the graft but nothing straight ahead. The specialist says it may take more than a year before normal vision is restored, but she expects the vision to return to normal except where the scarring occurred."

A new procedure called a diamond burr debridement is considered highly effective. "It uses the same idea as the keratotomy," Montgomery says. "A small diamond-tipped rotating burr is used to polish the corneal surface. It is considered safer than keratotomies."

Although no medication alone can cure Boxer ulcers, some may help promote healing. One recent study of dogs with SCCED showed that topical tetracycline (tetracycline) ointment significantly shortened healing compared with a placebo.1 The researchers hypothesized that increasing the expression of growth factors and signaling targets helped to increase the corneal epithelial cell migration, thus offering a safe, effective way to increase healing.

Autologous serum eye drops extracted from the plasma of a dog's blood also may help promote healing by inducing the new corneal epithelium to produce a stable adhesion. Currently, studies are being conducted at various institutions to test the effects of medications containing growth factors, such as an epidermal growth factor, a growth factor that stimulates cell growth, and fibroinectin, a cell adhesion molecule that anchors cells to collagen.

Restored Eyesight Is Worth the Wait

Eye surgery can be expensive, especially for Boxers that require multiple procedures to treat ulcers. Although Jewel's case is atypical, complications such as she experienced can occur with any corneal ulcer. Dale spent thousands of dollars treating her Boxer's SCCED. She believes the end result — the reduction in pain and the gradual return of her dog's eyesight — was well worth the effort.

"We recently learned that Jewel's half-sister has developed ulcers," Dale says. "It isn't entirely unexpected given the condition is more common in Boxers than other breeds and the inherited nature of the disease. I am so excited to contribute my dogs' DNA to the genetic research that has just begun."

If all goes well, Montgomery and his team may find a genetic marker, and then the causative mutation, that will pave the way to the development of a genetic test that can identify carriers and affected dogs. Boxer ulcers may one day become an eye disorder of the past. "


Boxer Ulcers continued from page 1

Drs. Keith Montgomery of North Carolina State University College of Veterinary Medicine has received a two-year grant from the AKC Canine Health Foundation to study spontaneous chronic corneal epithelial defects (SCCED), or "Boxer ulcers." The goal is to identify the gene mutation and develop a DNA test to help breeders decrease the frequency of SCCED in the breed. Participation is confidential. Please contact Montgomery at 919-515-8117 for information. Here is who is eligible to participate:

- Boxers of any age diagnosed with SCCED by a board-certified veterinary ophthalmologist. The ophthalmologist should contact Montgomery to ensure the dog is a candidate and for information about submitting DNA.
- Boxers approximately 10 years of age with normal eye examinations throughout their lives.
- Boxers over 9 years of age with no history of eye problems are eligible for a courtesy eye examination. North Carolina State University will allow them to be considered for participation in the study.

Boxer Breeders Can Contribute to SCCED Genetic Research

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Purina appreciates the support of the American Boxer Club and particularly Joyce Campbell, D.V.M., chair of the ABC Health and Research Committee and a trustee of the American Boxer Charitable Foundation, in helping to identify topics for the Purina Pro Club Breeder Update newsletter.
Creating a lasting impression with his easy, graceful gait and thick, curly black coat, GCH Claircreek Impression De Matisse is leading the pack in the Pro Plan Champions Cup standings with 234 points earned through April 30.

The 2 ½-year-old male Portuguese Water Dog, who is called “Matisse,” was bred by Donna Gottdenker, who co-owns him with Milan Lint and Peggy Helming. After finishing second in last year’s Champion Cup program, Matisse continues to dazzle judges and spectators with help from professional handler Michael Scott.

The yearlong Pro Plan Champions Cup award program is based on points tabulated from Bests in Show and Group placements at more than 200 Purina-sponsored all-breed dog shows in 2014. This year’s winner will be determined in early 2015. The Pro Plan Champions Cup winner will receive a $10,000 cash prize, an original oil painting by dog portrait artist Linda Draper and a keepsake Pro Plan Champions Cup trophy.

The Pro Plan Champions Cup winner will receive a $10,000 cash prize, an original oil painting by dog portrait artist Linda Draper and a keepsake Pro Plan Champions Cup trophy. A permanent Pro Plan Champions Cup is displayed at the Purina Event Center in Gray Summit, Mo., along with a plaque engraved with the winners’ names.

Cash prizes also will be awarded to the top-placing dogs as follows:
• Second place, $5,000
• Third place, $2,500
• Fourth place, $1,250

To view a tabulation of individual dog’s points and a listing of qualifying shows, please visit the Purina Pro Club website at purinaproclub.com. The Pro Plan Champions Cup is sponsored by Purina Pro Plan brand dog food.

![Matisse](image)

FortiFlora Now Eligible for Purina Points

Did you know that Purina Veterinary Diets FortiFlora brand canine nutritional supplement has been added to the list of products eligible for Purina Points? Weight circle submissions from FortiFlora, a nutritional supplement available by prescription only that provides dietary management of dogs with diarrhea, are 390 points per box.

“We are excited to add FortiFlora to the Pro Club program,” says Lisa Walsh, Purina Pro Club Communications Manager. “This product can have such a great impact on dogs’ digestive health, helping to protect them from the stress of extended trips and changes in routine, which is a common concern with show and sporting dogs.”

A new Pro Club Dog Weight Circle Submission & Reward Order Form is available online at https://purinaproclub.com/content/download/Dog_Weight_Circle_Form.pdf or by calling 1-877-PRO-CLUB (1-877-776-2582) between 7 a.m. and 5 p.m. CDT Monday through Friday.

Want to Reach the Editor?

Have comments about the Purina Pro Club Update? Send them to us at: Purina Pro Club Update, c/o Editor, Nestlé Purina PetCare, 2T Checkerboard Square, St. Louis, MO 63164 or via email at today’sbreeder@purina.com.

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Location</th>
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<tbody>
<tr>
<td>Pennsylvania Beagle Gundog Association Derby Runoff</td>
<td>June 14–15</td>
<td>St. Thomas, PA</td>
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<tr>
<td>National Amateur Retriever Championship</td>
<td>June 14–21</td>
<td>Roseburg, OR</td>
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<tr>
<td>Purina All-Age &amp; Top Shooting Dog Awards</td>
<td>June 21–22</td>
<td>Lexington, KY</td>
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<tr>
<td>Professional Kennel Club Breeders Showcase</td>
<td>July 24–26</td>
<td>Aurora, KY</td>
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<tr>
<td>UKC Autumn Oaks</td>
<td>Aug. 28–30</td>
<td>Richmond, IN</td>
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* This table lists some, but not all, upcoming Purina-sponsored sporting events.
When dogs are traveling on the circuit to field trials or conformation shows, it is not uncommon for them to lose their appetite. Purina Pro Plan is introducing SAVOR Additions Natural Purées, a natural, nutritious flavor enhancer, to help stimulate meals. Purina Pro Plan SAVOR Additions are highly palatable and made with nutrients such as antioxidants or prebiotic fiber. They do not contain added artificial colors, flavors or preservatives, and are formulated without corn, wheat or soy. They are made with human-grade ingredients.

Available in four purée blends, Pro Plan SAVOR Additions come in squeezable, resealable 4.5-ounce pouches that are convenient and easy to use. This enables owners to lightly coat a dog’s dry kibble and then mix it in. The featured blends are:

- Beef & Carrot Purée with antioxidants from vitamins A and E
- Berry Blend Purée with antioxidants from vitamins A and E
- Chicken & Pumpkin Purée with prebiotic fiber from inulin
- Oatmeal & Apple Purée with prebiotic fiber from inulin

Pro Plan SAVOR Additions should not exceed 10 percent of a dog’s daily calories. Toy and small breeds up to 30 pounds should be fed one-quarter to one-half pouch per day; medium-sized breeds from 31 to 49 pounds up to one pouch a day; and large and giant breeds more than 50 pounds one to two pouches per day.

The new Purina Pro Plan SAVOR Additions Natural Purées will be sold individually starting in June at pet specialty and farm supply stores. For information, visit proplan.com or talk with a pet nutrition consultant, call 800-PRO-PLAN (800-776-7526) from 7 a.m. to 7 p.m. Central time Monday through Friday.

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**Purina-Sponsored Dog Shows**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Location</th>
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<tbody>
<tr>
<td>Eagle Rock Kennel Club Dog Show &amp; Blackfoot Cluster</td>
<td>June 12-15</td>
<td>Blackfoot, ID</td>
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<tr>
<td>Central Florida Kennel Club Dog Show &amp; Cluster</td>
<td>June 19-22</td>
<td>Orlando, FL</td>
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<tr>
<td>Oklahoma City Kennel Club Dog Show &amp; Summer Classic</td>
<td>June 25-29</td>
<td>Oklahoma City, OK</td>
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<td>Texas Kennel Club Dog Show &amp; Lone Star State Classic</td>
<td>July 3-6</td>
<td>Dallas, TX</td>
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<td>July 4-6</td>
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<td>Houston Kennel Club Dog Show &amp; Reliant Park World Series of Dog Shows</td>
<td>July 16-20</td>
<td>Houston, TX</td>
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<td>Greenville Kennel Club Dog Show &amp; Carolina Foothills Dog Show Summer Cluster</td>
<td>July 23-27</td>
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<td>Steel Valley Cluster</td>
<td>July 31-Aug. 3</td>
<td>Canfield, OH</td>
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<td>Penn Ridge Kennel Club Dog Show &amp; Keystone Cluster</td>
<td>Aug. 8-10</td>
<td>Harrisburg, PA</td>
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<td>Topeka Kennel Club Dog Show &amp; Capitol City Cluster</td>
<td>Aug. 15-24</td>
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<td>Santa Barbara Kennel Club Dog Show</td>
<td>Aug. 23-24</td>
<td>Santa Barbara, CA</td>
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<tr>
<td>Bayou Kennel Club Dog Show &amp; Cottonland Cluster</td>
<td>Aug. 29-Sept. 1</td>
<td>Monroe, LA</td>
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