Cow Eyeball Dissection

p5 **Activity Time**: 15-20 minutes **Targeted Age**: 6-10 year**Learning Objectives**: Children will understand the form and function of an eye.

Children will observe different parts of the eye.

Supplies:

- ☐ Dissection Kit: scalpel, scissors
- ☐ Gloves
- ☐ Dissection tray
- ☐ Preserved cow eyeball
- ☐ Orange tray

Set-Up:

Keep the dissection tray on top of an orange tray. Keep scalpel in box when not in use.

Safety:

Do not let kids use the scalpel. Anyone who touches the eye must wear gloves. Cut away from fingers when using scalpel.

Science Content:

The cow eye is similar to a human eye in many ways. Key differences include: **size** (cow eyeballs are larger), **muscles** (humans have 6 per eye, cows have 4), and the **tapetum** (humans do not have a tapetum, while cows and many other animals do).

Observe the diagram below to locate the different parts of the eye.

Activity #1—Outer Portion of the Eye

- Take eye out of plastic wrap.
- Pass eye around and ask questions of audience.
- Trim away fat and muscle with scissors (brown & white). Be careful around the back of the eye—there is an off-white nub. Do not cut; this is the optic nerve.
- Trim fat until eye resembles a sphere with optic nerve extruding from back.
- Bring audience attention to the cornea.
- Take scalpel and make incision halfway between the 'half mark' of the scelera and cornea.
- Put scalpel away—place scissors inside incision and cut around the eye parallel to the cornea.
- Pull the two halves apart.

Questions To Ask:

- What is the white stuff? Brown stuff?
- Why can't you see through the cornea?
- What is 'that nub'? What does the optic nerve do?
- Do you think your eye is this hard?

Science Content:

The optic nerve sends information from eye to brain. Cow eyes have four muscles, human eyes have six. The eye is cushioned with fat to protect and insulate it. Cornea is cloudy because the cow stopped blinking. Cornea clear portion of outer covering of eye called the sclera.

Activity #2—Front Half of the Eye:

- There will be a "blob of clearish white jello" attached to the front.
- Remove it gently. This is the vitreous humor.
- Pass it around; ask questions from Section 2.
- There will be a small off-white bead-like thing. This is the lens; gently pull it out of the eye.
- Pass it around, being careful not to squeeze.
- Discuss the function and aqueous humor.
- Peel off a few layers (audience can participate) and talk about the 'aging of the eyes'.
- Show the iris.
- Ask kids to look into each others' eyes. What color is their neighbor's eye?
- Pass around front portion of eye.
- Talk about the sphincter muscles.
- 'Follow" a photon through the cornea, aqueous humor, pupil, lens, vitreous humor to the back of the eye and optic nerve.

Questions To Ask:

- What is the whitish blob? What does it do?
- What is the pupil?
- What is the iris? What does it do?

Science Content:

When you open the eye, there are no blood vessels inside the 'body of the eye', the vitreous humor. It carries nutrients and oxygen to the inside of the eye and helps maintain its shape. The lens allows us to focus by bending slightly, as people use their lens adds layers which decreases their ability to focus from close up to far away (near or far sighted as one ages.) The pupil is a hole right in front of the lens, in the middle of the iris. The iris is the colored portion of the eye, it is a sphincter muscle which can change size of pupil to increase or decrease amount of light into eye. The aqueous fluid is a small amount of water between the lens and cornea going through the pupil, it helps focus light, but not to the extent of the lens.

Activity #3—Back Half of the Eye:

- The light grey stuff is the retina.
- Ask questions from Section 3.
- Gently scoop to the connecting point with one finger.
- The connecting point is where the optic nerve connects to the retina. This is the blind spot.
- Behind the retina is blue tissue called the tapetum.
- Pass back half of eye around.
- Ask if anyone has questions.

Questions To Ask:

- What 'sees' light in the eye?
- What do cows have in their eyes that humans don't?
- What does the eye feel like? What is the optic nerve like?
- How does what we see get to the brain?

Science Content:

In the back of the eye, you will see: the retina, optic nerve, and tapetum. The retina a light sensing cells (rods) and color sensing cells (cones). These act as a kind of camera, and the optic nerve acts as a cord, connecting the retina to the brain. Where the retina attaches to the back of the eye is the fovea. This is the blind spot of the eye because there are no rods or cones at that part of the retina. This is also the beginning of the optic nerve. Behind the retina is the tapetum, a blue-ish, pearly tissue. Animals like cows, sheep, cats, dogs, and deer have a tapetum, but humans do not. The tapetum reflects light, allowing it to pass through the retina a second time. This gives these animals better night vision. We see the reflection of the tapetum when we shine a light in their eyes.