

Terminology and Construction of Ropes

Our topics for this week are:

- Terms used for ropes
- Rope construction
- Parts of an animal handling rope

Ropes, Knots, and Hitches

Ropes are essential tools for working safely with animals, particularly livestock and horses. They can save a handler's life or endanger it depending on the skill exercised in using them.

Egyptians began using ropes and simple knots to handle animals at least 6,000 years ago. Now, there are approximately 4,000 knots recorded, most of which were developed by sailors.

A famous knot in mythology was the Gordian Knot. Gordius was a peasant who became an ancient king of Phrygia (fra-GEE-a), a section of the current nation of Turkey. He tied the yoke of his ox cart to a pole with a knot that no one could untie. Whoever could undo the knot was said to be destined to become ruler of all of Asia. When Alexander the Great came to Phrygia in 333 B.C. and saw the knot, he severed it with his sword. By the age of 30, Alexander ruled Asia.

“Cutting the Gordian Knot” is a phrase that means quick to make a decision in a difficult situation. Good animal handlers must, on occasion, cut the Gordian Knot, figuratively and literally. Quick knot cutting in an emergency is literal when animals become bound in ropes and struggle. All good handlers who use ropes carry a sharp, easily accessible knife for this purpose.

Terminology and Rope Construction

Definition of Terms

Ropes are more than 5/12 inches in diameter. Smaller fiber diameters are referred to as cord, twine, string, or thread. Ropes are made of natural fiber or synthetic fibers. A rope that is used to handle or restraint livestock and horses is called a *lariat*. A lariat may have a running noose for catching animals or no noose for tying (tethering, picketing) animals.

Natural Fiber Rope

Among natural fibers, *manila* and *hemp* are strongest plant fibers for ropes. Hemp is smoother than manila and from the stalk of *Cannabis sativa*, a non-drug species of the marijuana family. Hemp is the oldest rope fiber, but its use declined approximately 200 years ago due to preference for the stronger manila rope. Until World War II, manila rope, from the leaves of *Musa textilis*, a member of the banana family was widely used. Synthetic fiber ropes became common after WWII. Most manila rope came from the Phillipines, and it derives its name from the capital of the Phillipines. Cotton and flax (both soft) are more manageable but will stretch and rot. Cotton continues to be widely used for lead ropes and is the preferred type of rope for restraining animal legs.

Jute and sisal are less expensive, weaker plant fibers. Jute and sisal are natural fibers more commonly used for making twine. Jute is from *Corchorus* plants, and sisal is from the leaves of *Agave sisalana*.

Leather was used by Spanish and Mexican vaqueros to plait 4 to 12 strands of leather into 3/8 inch diameter rope called a *reata* (riata is an Americanized spelling of reata) of 50 to 65 feet in length. The average nylon rope for catching cattle is 30 to 40 feet long. Leather reatas are strong, flexible, and thin but with sufficient weight for long throwing. However, they require frequent treatment with tallow to prevent sunlight or water damage. They are also about 10 times more expensive than other ropes. The word *lasso* comes from the Spanish word “lazo” meaning noose or snare.

Maguey ropes (from fibers of the maguey plant) are hand-made 4 stranded ropes, 3/8 inches in diameter from the maguey plant in Mexico. These have a smooth surface and are relatively firm, which aids in forming loops. They are the preferred rope of Mexican charros. The use of natural fiber ropes (made from hemp, abaca, or yucca plants) spread from Mexico into North America. Reatas and maguey ropes should be dallied (wrapped around an object) rather than tied due to the risk of breaking if jerked with much weight.

The advantages of natural fiber ropes are a hairy-like rough surface that provides better traction and easier grip. Horses may respect the roughness (fiber ends that stick out are called “staples”) more than smooth, soft ropes. Mecates are vaquero (Spanish-style) reins for training horses that were originally made of horsehair for its strength and prickliness. The disadvantages of natural fiber ropes are that they absorb water and swell, making knots difficult to untie. They can support mildew and rot, and they become brittle from strong sunlight or salt.

Natural fiber rope is always *twisted* (also called laid) to increase strength from alternate twisting (“laying up”) of components. Prior to World War II, all rope was twisted. Fibers are twisted commonly to the right to form yarn. Three yarns are twisted to the left to form strands. Three strands are twisted to the right. Rope with strands twisted to the right are Z-laid; S-laid is twisted to the left. Ropes have 8 to 22 twists per foot. Hard twisted rope has more twists per foot and are stiffer. Three stranded rope is plain, also called hawser-laid rope. More than 3 strand rope is weaker than 3 strand of the same diameter. Four stranded rope is smoother than 3 stranded rope but harder to grip. Synthetic fiber rope is occasionally twisted. Twisted rope, with its lumpy surface, holds knots and hitches better than single cord rope. A *splice* is interweaving sections of untwisted rope. Twisted rope can be untwisted in sections to form a loop on an end of a rope with an eye splice or to join two ropes together by a short splice of the end of each rope.

One of the disadvantages of twisted rope is that there is no protective outside layer. Every fiber twists to the outside multiple times being exposed to abrasion, moisture, and sunlight.

Synthetic Fiber Rope

Synthetic ropes vary in material and in strength. However, because synthetic rope is generally made of continuous fibers that run the length of a rope, synthetic ropes are stronger than natural fiber ropes. Natural fiber ropes are composed of short fibers that do not extend the length of the rope. Most ranch ropes are a nylon-polyester combination for strength with moderate elasticity in a twisted pattern. Synthetic ropes are lighter, stronger, and less expensive than natural fiber ropes.

In addition, they do not rot or become brittle. The disadvantages of synthetic fiber ropes are that

heat, even friction, can cause them to melt and their smoothness can cause hand grips and knots to slip.

Synthetic fiber types and relative strength, in decreasing order of strength, are:

- Nylon (polyamide) - strongest and very elastic, but absorbs water
- Polyester - less elastic, more UV resistant, resistant to water
- Polypropylene - weaker, susceptible to UV damage, and can melt with heat from friction

Synthetic fiber ropes are constructed in a variety of patterns. They may be twisted, as with natural fiber ropes, *plaited* in 4 to 8 stranded solid plaits, or *braided* in 16 or more strands (the *mantle*) around a core of long twisted center fibers (the *kern*). The mantle of braided rope protects the inner fibers while all fibers of twisted or plaited rope are exposed to the elements. Braided synthetic rope is soft, strong, and flexible with various uses, including mountain climbing. Plaited and braided rope do not hold knots and hitches as well as twisted rope.

The Shoof Vet-Rope is a marine grade polyester, oval-shaped, rope that is woven with hollow center, which causes it to flatten with tension. It is made in New Zealand. The Shoof rope is used for leg restraint of large animals and permits greater comfort to the animal and the handler, but its construction also allows it to stretch more than conventional twisted rope, which can be disadvantageous in some restraints.

Rope Parts

Ropes have a *working end*, *standing part*, and *standing end*. A 180 degree bend in a rope is called a *bight*. A circular bend is a *loop*.

A sliding loop (noose) can be made with a knot, called a *honda*, that forms a small fixed loop or channel for the rope's standing end to slide through. Hondas made with the rope may have a small leather wrap called a "burner" around the honda loop to reduce friction as the slip loop slides through. Hondas may also be metal (aluminum or stainless steel) or plastic. Metal hondas allow the rope to slip back and forth more easily to provide immediate pressure release when an animal stops resisting restraint. Metal hondas are also more reliable in wet conditions. Tied hondas may have a metal lining inside the tied loop to permit better sliding similar to a complete metal honda. Hondas may have a swivel base or designed to allow breakaway for roping practice. If to be used around the neck of a horse, a double-overhand knot can be tied in the rope (2 ft from the honda for 2-year-olds and 18 inches for weanlings and yearlings) to prevent the loop from completely closing and squeezing the neck of young horses.

A quick release honda is a metal honda that can be opened to release a caught animal without the need to loosen the slip loop. Quick release hondas have a finger latch to quickly open the metal honda. The finger latch has a hole in it so that a leather string can be grabbed to open the latch rather than putting a finger in the honda and endangering that finger if the animal moves while the finger is entrapped.

Now, let's recap the key points to remember from today's episode:

- Animal handlers must carry a sharp knife when working with ropes

- Twists make natural fiber ropes much stronger and knots tighter
- Synthetic fiber ropes are stronger than natural fiber ropes
- Plaited and braided ropes are easier to handle than twisted ropes, but knots are less secure
- Quick release metal hondas can enhance the safety of putting a rope loop around some animals

More information on animal handling is available in my book, *Animal Handling and Physical Restraint* published by CRC Press. It is also available on Amazon and from many other fine book supply sources.

Additional information is available at www.betteranimalhandling.com

Don't forget serious injury or death can result from handling and restraining some animals. Safe and effective handling and restraint requires experience and continual practice. Acquisition of the needed skills should be under the supervision of an experienced animal handler.