

Backyards & Beyond

Summer 2010

RURAL LIVING IN ARIZONA

Volume 4, Number 2



Featured Plant

Common Name: Ocotillo
Pronounced: oh-koh-TEE-yoh
Scientific Name: *Fouquieria splendens*



Susan Pater

N Nehring

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Ocotillo (*Fouquieria splendens*) is a unique native desert plant with low-branching, leafy, whip like canes. Ocotillos can grow to 15 feet in height and as wide. In spring, it is topped with bright orange-red, tubular flowers providing migrating hummingbirds with much needed nourishment. In Spanish, ocotillo means little "torch." They are typically leafless most of the year, but produce many leaves after significant precipitation. During periods of drought, ocotillos shed their leaves to reduce evaporative loss and conserve plant

moisture. Ocotillos are extremely drought tolerant and an excellent accent plant for residential and commercial landscapes.

Ocotillo is not a cactus since it grows true leaves. It is a close relative of the Boojum tree (*Idria columnaris*) which is native to isolated areas of Baja California and Sonora, Mexico. Ocotillo is often found in stands consisting of many individual plants. In the past, canes have been harvested and used for fences. The canes often took root and created living fences that leaf out and bloom (do not harvest native ocotillo-they are protected by Arizona's Native Plant Law-more below).

Ocotillos are available from selected nurseries. In Arizona, landowners have the right to destroy or remove ocotillos (and other protected plants) growing on their land, but 20 to 60 days prior to the destruction of any protected native plants, landowners are required to notify the Arizona Department of Agriculture. The landowner also has the right to sell or give away any plant growing on the land. However, protected native plants may not be legally possessed, taken or transported from the growing site without a permit from the Arizona Department of Agriculture.

Transplanting of these desert plants can also be done the year around with knowledgeable care, but greatest success is achieved during March through May. Transplant to the original growing depth and, as with cacti, in their original directional orientation. The original south side of the plant, which has become more heat and sunlight-resistant, should again face the hotter southern direction. Well drained sandy or gravelly loam soils with light to moderate amounts of organic content favor root development of these desert plants.

To help prevent the newly transplanted ocotillo from falling over or blowing down in a storm, large stones may be placed over the root area (2-4 inches from the trunk). Sunny, open, unrestricted locations and those where surface water does not collect are best. Some degree of growth set-back is to be expected. Properly transplanted, however, ocotillos reestablish themselves fairly successfully. It's not necessary, nor recommended, that the tops of any cacti, agave, yucca or ocotillo plants be pruned back when transplanting.

Ocotillos are a wonderful plant if you have the proper space and soil type. If you don't have room for one, enjoy and appreciate the native ocotillo stands that exist. Also, remember to contact the Arizona Department of Agriculture, 1688 W. Adams, Phoenix, Arizona 85007, (602)364-0935, web address: agriculture.state.az.us, for specific regulations, restrictions, permits, penalties, etc., before digging and moving any cacti, agaves, ocotillos, yucca, etc.

Featured Bird

Common Name: Greater Roadrunner
Scientific Name: *Geococcyx californianus*



Dan L. Fischer

Dan L. Fischer, Author of *Early Southwest Ornithologists, 1528-1900*, University of Arizona Press

The notes that follow apply to one of the most remarkable and amusing birds readily observed in the Southwest. Commonly referred to as Roadrunner, Chaparral Cock or Ground Cuckoo, it is certainly one of our most interesting and appealing avian creatures. The Mexicans refer to the bird as paisano meaning affectionately "compatriot" or "fellow countryman." The *correo del camino*, as it also sometimes called, is analogous to roadrunner. In Arizona it occurs throughout most of the lower southern regions below the Mogollon Rim and is considered scarce elsewhere. Although found in the mid-elevations of pinyon-juniper and oak woodlands, the bird is more often observed among mesquite, creosote bush, paloverde, various cacti and grasslands that include yucca.

The Greater Roadrunner is a rather large bird, almost two feet in length, that is brownish with black streaks and possesses a very long tail. Its wingspan is only slightly less than its length. As it hurries along in search of food, its distinctive tail is raised or lowered and often swished back and forth. In addition to a large formidable decurved bill, it has a short crest which it frequently elevates. Supporting the body are long gray legs which have toes in a zygodactyl arrangement. Their common "X" impressions in powdery sand readily show that the toes are aligned in pairs; the second and third toes are in front, while the fourth and hallux, or hind toe, are behind.

The running speed (20 mi per hr) and agility of this bird were noted by early naturalists even before it was officially described. In 1828, the ship's Italian-born doctor Paolo Emilio Botta (1802-1870), on board the French trader *Le Heros* off the California coast, wrote that the "bird called charia runs very swiftly, jumping occasionally and beating its wings, which we might call flying..." He was observing its swift behavior as it frequently dashes about with occasional short flights and glides, in pursuit of insects, lizards, snakes, small rodents and young birds. On some cold winter mornings Greater Roadrunners often elevate their back and neck feathers facing the sun so as to expose their black-pigmented skin to its warming rays.

Toward the end of March nesting begins for the Greater Roadrunner as its lays three to six glossy white eggs in a rather poorly constructed twig structure in a dense scrub, tree or cactus. Unlike most birds it begins incubation immediately, whereby the clutch results in asynchronous hatching with uneven ages of unhatched, weaker or neglected siblings. The parents, if ample food is available, may double-brood. The male birds also tend and care for the young.

In the period between 1787-1803, expeditions by Spain into New Spain, on the North American continent, resulted in an unfortunate set of circumstances for many early naturalists who received little recognition for their many achievements. Among them were Spanish physician Martin de Sessé (1751-1808) and Mexican-born José Mariano Moziño (1757-1820), who recorded many plants and animals of the region. Artists of exceptional talent accompanied them and painted many of their discoveries including the Greater Roadrunner. Because of the political turmoil in Spain these findings were not published at the time and shared with the scientific world. This bird was later described by French naturalist R. P. Lesson (1794-1849) in 1829.

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rural living in Arizona

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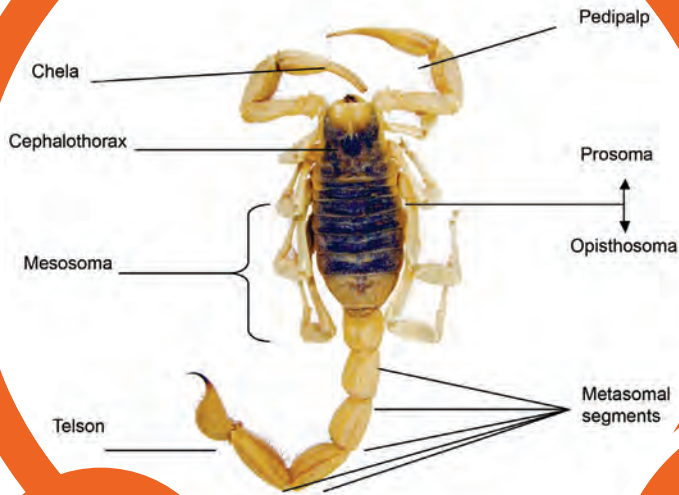
Susan Pater

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Cover Photo credit: Nicolas Loran

Scorpions in Arizona



Desert Hairy Scorpion
(*Hadrurus arizonensis*)

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Scorpions have long been of interest to humans primarily because of their ability to give painful and sometimes life threatening stings. Scorpions are also an important and beneficial component of many ecosystems and they are one of the oldest known terrestrial arthropods. Fossil scorpions found in Paleozoic strata 430 million years old appear very similar to present day species. There are currently 1400 recognized species of scorpions worldwide. Scorpions have an elongated body and a segmented tail that is tipped with a venomous stinger. They have four pairs of legs and pedipalps with pincer-like pincers on the end, which are used for grasping.

RANGE AND HABITAT

Scorpions are commonly thought of as desert animals, but in fact, they occur in many other habitats, including grasslands and savannahs, deciduous forests, montane pine forests, intertidal zones, rain forest and caves. Scorpions have even been found under snow-covered rocks at elevations of over 12,000 feet in the Himalayas of Asia.

DESCRIPTION

As arachnids, scorpions have mouthparts called chelicerae, a pair of pedipalps, and four pairs of legs. The pincer-like pedipalps are used primarily for prey capture and defense, but are also covered with various types of sensory hairs. The body is divided into two main regions, a cephalothorax and an abdomen. The cephalothorax is covered above by a carapace (or head shield) that usually bears a pair of median eyes and 2 to 5 pairs of lateral eyes at its front corners (a few cave and litter-dwelling scorpions are completely eyeless). The abdomen consists of 12 segments: the seven wider segments closest to the cephalothorax are called the

mesosoma and the last five narrower segment forming the metasoma. At the end of the metasoma is the telson, which is a bulb-shaped structure containing the venom glands and a sharp, curved stinger to deliver venom.

BEHAVIOR

Scorpions are nocturnal or diurnal, predatory animals that feed on a variety of insects, spiders, centipedes, and other scorpions. The larger scorpions occasionally feed on vertebrates, such as small lizards, snakes, and mice. Prey is detected primarily by sensing vibrations with the comb-like pectine organs that also sense textures of the surfaces they walk on and serve as chemoreceptors that can recognize other scorpions of the same species. The pedipalps have an array of fine sensory hairs that sense air-borne vibrations; the tips of the legs have small organs that detect vibrations in the ground. Most scorpions are ambush predators who detect prey when it comes within reach.

Although they are equipped with venom for defense and prey acquisition, scorpions themselves fall prey to many types of creatures, such as centipedes, tarantulas, insectivorous lizards, snakes, birds (especially owls), and mammals (including shrews, grasshopper mice, and bats). As with many predators, scorpions tend to forage in distinct and separate territories, returning to the same area each night. They may enter homes and buildings when their territory has been disrupted by construction, tree removal, irrigation, or floods, etc.

Scorpions have many adaptations for desert living. Most are active at night, and spend their days where it is cool and moist under rocks, wood, tree bark or in burrows. Although scorpions can be seen drinking directly

from water reservoirs, they derive most of their water from their food (although this varies by species). As with most arthropods their activity is linked to temperature. Generally speaking, scorpions are active if nighttime temperatures are above 70°F. They tend to be less active during winter and the hottest part of the summer during daylight hours.

LIFE CYCLE

The sperm from the male is contained within a structure called a spermatophore. The sperm is deposited by the male on a surface over which the female is pulled. The female draws the sperm into her genital pore, that is located near the front ventral (under) side of her abdomen.

Scorpions have a long gestation period (from several months to over a year, depending on species) in which the young develop as embryos in the female. The young are born live and ascend their mother's back. She assists them by making a "birth basket" with her folded legs to catch them as they are born and to help them climb onto her back. A few Old World species do not form birth baskets.

On average, a female gives birth to about 25-35 young. They remain on her back until they molt for the first time. The white colored young have been seen to climb down off the mothers back, molt then return to the mothers back for another 4-5 day before leaving for good, usually within one to three weeks after birth. Once they climb down, they assume an independent existence, and periodically molt to reach adulthood. The average scorpion probably lives three to five years, but some species may live up to 25 years.

SCORPION VENOM

The venom of scorpions is used for both prey capture, defense and possibly to subdue mates. All scorpions do possess venom and can sting, but their natural tendencies are to hide and escape. Scorpions can control the venom flow, so some sting incidents are venomless or only mild envenomations. Scorpion venoms are complex mixtures of neurotoxins (toxins which affect the nervous system) and other substances; each species has a unique mixture. Despite their bad reputation, only one



species in the western U.S. (the bark scorpion, *Centruroides sculpturatus*) and about 25 others worldwide have venom potent enough to be considered dangerous to humans.

The world's most dangerous scorpions live in North Africa and the Middle East (species in the genera *Androctonus*, *Buthus*, *Hottentotta*, *Leiurus*), South America (*Tityus*), India (*Mesobuthus*), and Mexico (*Centruroides*). In some of these areas, scorpion stings may be a significant cause of death, but reliable data on human mortality are not readily available. Some studies suggest typical mortality rates up to about 4% in hospital cases, with children and the elderly being most susceptible. Death by scorpion sting, if it occurs, is the result of heart or respiratory failure some hours after the incident. During the 1980's Mexico averaged about 800 deaths each year. However, in the past 20 years, there have been no reported fatalities in the U.S. due to scorpion stings.

THE BARK SCORPION

About 40-60 species occur in Arizona, although many are undescribed. The previously mentioned bark scorpion (*Centruroides sculpturatus*) is the only species in Arizona of medical importance.

In the U.S., the bark scorpion is found in southeastern California, Arizona, Nevada, southern Utah, and southwestern New Mexico. Small populations have been found in northern California and the state of Colorado. It is also found throughout the Baja Peninsula and western Sonora in Mexico. The typical "bark" or "crevice" scorpion is encountered in a variety of situations. It is most commonly found under rocks, logs, tree bark, and other surface objects. The bark scorpion (1-3 inches in length) is the most commonly encountered house scorpion. They are common throughout many habitats but almost always in rocky areas. Bark scorpions may over-winter in aggregates (groups) of 20-30. The bark scorpion is also one of relatively few species that are able to climb vertical walls, but do not make it far across a horizontal ceiling.

The venom of the bark scorpion may produce severe pain (but rarely swelling) at the site of the sting, numbness, frothing at the mouth, difficulties in breathing (including respiratory paralysis), muscle twitching, and convulsions. Death is rare, especially in more recent times. Antivenin is available for severe cases. Envenomation of children (under 9 year of age) or people with hypertension should be considered serious and immediate medical help sought (dial 911). Certain people, however, may be allergic to the venom and can experience life-threatening side effects when stung (as occurs with bee stings). No cases of anaphylaxis have been reported in Arizona.

**The Arizona Poison Control and
Drug Information Center**
1-800-222-1222
24 hours a day • 7 days a week •
365 days a year • Free • Confidential

BLACK-LIGHTING

Scorpions fluoresce or glow under ultra-violet light so they are easy to find with the aid of a portable, hand-held black-light during the night. Nighttime scorpion hunting is a lot of fun, but make sure that you wear boots and have long tongs if you want to capture the scorpions to move them. Powerful black-lights can be ordered from the internet or weaker ones can be obtained from pet stores and electronic retailers. Never look directly at an ultraviolet light, damage to the eye may occur.

Once located, collect the scorpions using long forceps and keep them in a sealable, sturdy container. As these wonderful creatures are such a benefit to our environment please consider collecting and releasing the scorpions into the natural desert rather than killing them. Chemical pesticide spraying during the day is largely ineffective against scorpions.

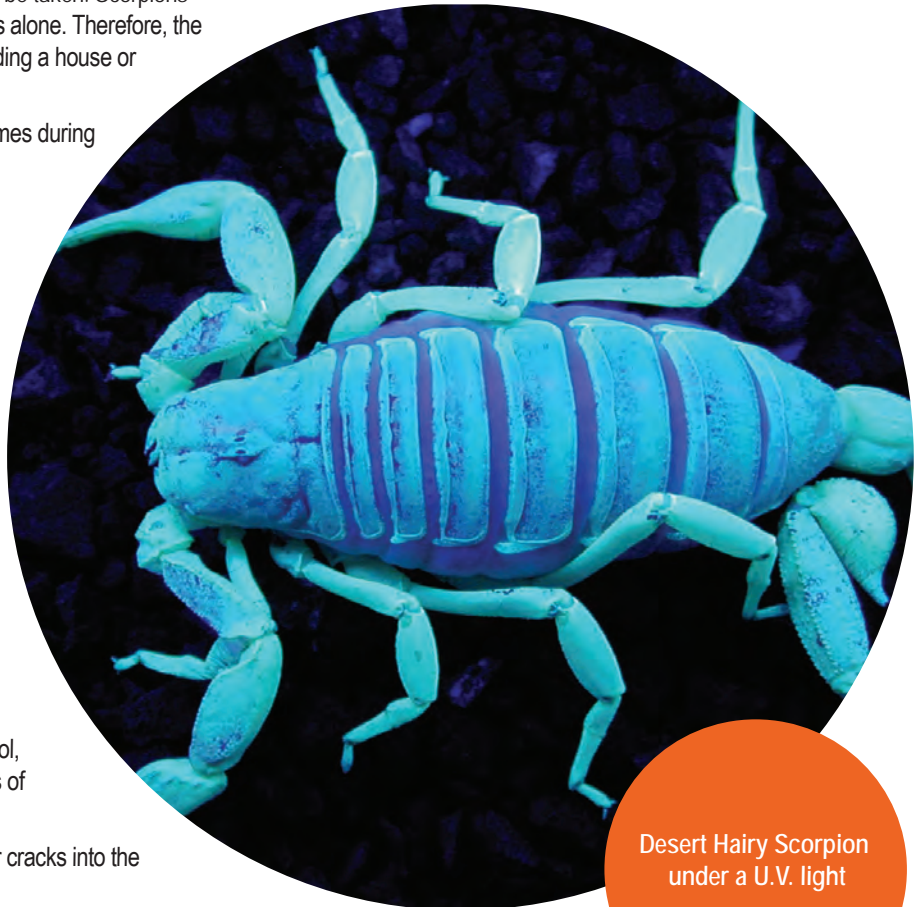
ADDITIONAL INFORMATION

Gouge, D., K. Smith, C. Olson, and P. Baker. 2001. Scorpions. University of Arizona Cooperative Extension Publication #AZ1223. 7 pp. (<http://ag.arizona.edu/pubs/insects/az1223.pdf>).

MANAGEMENT OF SCORPIONS

High numbers of scorpions can become a problem under some circumstances. Pest-proofing of the home is an essential first step. If a reduced population is desirable several steps can be taken. Scorpions are almost impossible to manage with insecticides alone. Therefore, the first control strategy is to modify the area surrounding a house or structure:

- Conduct ultra-violet light collections several times during the summer between 8-11 p.m.
- Remove all harborages such as: trash, logs, boards, stones, bricks and other objects from around the building.
- Keep grass closely mowed near the home. Prune bushes and overhanging tree branches away from the structure. Tree branches can provide a path to the roof for scorpions. Minimize low growing ground cover vegetation.
- Store garbage containers in a frame that allows them to rest above ground level.
- Never bring firewood inside the building unless it is placed directly on the fire.
- Install weather-stripping around loose fitting doors and windows.
- Plug weep holes in brick veneer with steel wool, pieces of nylon scouring pad or small squares of screen wire.
- Caulk around roof eaves, pipes and any other cracks into the building.
- Keep window screens in good repair. Make sure they fit tightly in the window frame.
- Stucco cinder-block walls.



Desert Hairy Scorpion
under a U.V. light

Stocking Small Pastures Using AUM's – Part 1

To determine how many grazing animals your pasture will support you need to know two things: 1) how much forage the particular animals you intend to graze in the pasture will consume, and 2) the amount of forage available for consumption. Part 1 will discuss how much forage your grazing animals will consume, while Part 2 will further explore stocking rates in our fall issue.

The animal unit month (AUM) concept was developed to quantify how much forage grazing animals consume. One AUM is the amount of forage required by an animal unit (AU) for one month, or the tenure of one AU for a one-month period. If one AU grazes in a pasture for six months, that tenure is equal to six AUs for one month or six AUMs. In general, the number of animal units, multiplied by the number of months they are on the range equals the number of AUMs used.

But how much forage is in one animal unit month? The standard animal unit is defined as a mature (1,000-pound) cow with calf (no older than 6 months) or the equivalent, based on an average consumption rate of 26 pounds of forage dry matter per. That makes an AUM equal to 31 days x 26 pounds per day or about 800 pounds of air-dried forage. More conservative or liberal values may also used, for example 600 to 1,000 pounds of forage per AUM depending upon specific circumstances.

Grazing animals other than cows are converted to an "animal unit equivalent" primarily according to body size. For example, a mature sheep has an animal unit equivalent of 0.20 or about 20% of an AUM. Tables 1 and 2 provide some commonly accepted animal unit equivalents that may be used as starting points to calculate the forage needs of your grazing animals.

Forage requirement values and conversion factors should only be used as a starting point when calculating and/or adjusting stocking rates. There are many variables that alter the animal unit requirement and change these basic relationships.

Standard conversion ratios should be modified locally to account for the type of range. For example, a proportionally larger number of sheep or yearling steers can be grazed on rough, poorly watered rangeland than standard conversion ratios would indicate. The vegetation mix may also alter this relationship.

Forage quality differences should also be considered. Seasonal changes in forage quality may increase or decrease the amount of forage animals must consume to meet maintenance requirements.

Finally, there is little or no research information on forage wastage whether by trampling, covering with feces or by other means. However, there does appear to be a positive relationship between grazing pressure (the animal-to-forage ratio) and efficiency of forage harvesting by the grazing livestock.

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In general, a value of 26 pounds of forage per day per animal unit seems to be a reasonable starting point for general management purposes. Local values may be modified with experience. Stocking levels should always be monitored with frequent pasture checks.

Table 1. Commonly used animal unit equivalents

| Class of Animal | Animal unit equivalent | Estimated pounds of forage consumed per day |
|----------------------------|------------------------|---|
| Cow, dry | 0.92 | 24.0 |
| Cow, 1,000 lbs. with calf | 1.00 | 26.0 |
| Bull, mature | 1.35 | 35.0 |
| Cattle, 1 year old | 0.60 | 15.6 |
| Cattle, 2 years old | 0.80 | 20.8 |
| Horse, mature | 1.25 | 32.5 |
| Sheep, mature | 0.20 | 5.2 |
| Lamb, 1 year old | 0.15 | 3.9 |
| Goat, mature | 0.15 | 3.9 |
| Kid, 1 year old | 0.10 | 2.6 |
| Deer, white-tailed, mature | 0.15 | 3.9 |
| Deer, mule, mature | 0.20 | 5.2 |
| Elk, mature | 0.60 | 15.6 |
| Antelope, mature | 0.20 | 5.2 |
| Bison, mature | 1.00 | 26.0 |
| Sheep, bighorn, mature | 0.20 | 5.2 |

From: USDA NRCS National Range and Pasture Handbook

Table 2. Adjusted animal unit equivalents for heavier cattle

| Class of Animal | Animal unit equivalent | Estimated pounds of forage consumed per day |
|---------------------------|------------------------|---|
| Cow, 1,000 lbs. with calf | 1.00 | 26.0 |
| Cow, 1,200 lbs. with calf | 1.20 | 31.2 |
| Cow, 1,400 lbs. with calf | 1.40 | 36.4 |
| Cow, 1,600 lbs. with calf | 1.60 | 41.6 |

extension.usu.edu/files/publications/publication/NR_RM_04.pdf

The Simple Pleasure of Homemade Bread

Darcy Tessman

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Bread bakers and their families know the pure pleasure of the smell of homemade bread baking. The beauty of a golden loaf cooling on a rack is a temptation that few can resist. Some families even have traditions about who gets to eat the heel and middle slices once the loaf makes it to the appropriate temperature for cutting. Homemade bread has an appeal far beyond just taste. Making your own bread allows you to increase wholesome grains and decrease sugars and preservatives. Modern technology allows you to use mixers for kneading or bread machines to do all of the work in the process if desired. With the knowledge of basic ingredients and techniques, you can be an expert bread baker in no time.

Understanding Gluten

All recipes start with ingredients and the main one in bread is flour. Flours differ by their protein content. This content is critical in bread making because flour has two gluten-forming proteins.²

Gluten is made up of the proteins glutenin and gliadin. Glutenin forms an interconnected gluten network that makes dough elastic while gliadin bonds weakly to the glutenin network and makes dough plastic.³ These proteins form together to create molecules that coil together so they can stretch and contract to make dough that can shrink back to its original shape. This molecular bond is needed to hold the carbon dioxide released from yeast so bread can rise.

Knowing the Ingredients

High protein flours (13 grams a cup) typically come from colder climate wheat that has more glutenin and gliadin. Southern flours or cake flours have lower protein contents and are used for cookies, biscuits, and pie crusts. These flours typically have only 8-9 grams per cup.² All-purpose flours can range from 8-13 grams per cup and are not recommended for bread. Flours labeled specifically for bread are usually 14 grams per cup.

Grains other than wheat such as corn, rye, oats, barley, rice, and more can be included in breads as great flavor enhancers, but only wheat flour can produce gluten. Whole grain flours can also be used, but whole-wheat flour has a smaller amount of gluten-forming proteins than white flour.² Whole-wheat flour still has the germ and the bran part of the wheat that takes up volume. To help whole grain breads rise, it is a

common practice to add vital wheat gluten or gluten flour as an additive as the bran in whole grain flour cuts the gluten strands. Vital wheat gluten is available through grocery or health food stores.

Yeast is a single celled organism that only needs sugar and oxygen to live. There can be some confusion with yeast as it can be found as fresh yeast, active dry yeast, instant yeast, and even wild yeast. Fresh yeast is hard to find and probably only available through a bakery. It looks like a block of butter. Active dry yeast is the most common and it comes in packages and jars. It is available at grocery stores. Stir it into warm water (110 degrees F) to activate it and allow it to hydrate in water for about 10 minutes. Instant yeast is also known as rapid rise or quick yeast and is usually not hydrated but is added directly into the dry ingredients. Wild yeast is how sourdough starters work. To get yeast to start, warm water (80 degrees F) must be used and oxygen (stirring) must be incorporated frequently. Keeping it warm is key.

Water is vital for gluten formation as some type of liquid is needed to hydrate the flour.

Salt is a flavor enhancer. It also tightens gluten (limits the fermentation process to a steady level) and lengthens the shelf life of the bread.

Milk can be used in breads, but be aware that it will soften the crust of the bread. It provides a mild taste and increases protein and calcium content.

Fats such as butter, oil, or other shortenings weaken the gluten structure and make the product tender and flaky.³

Dough enhancers improve the taste, texture and crust of bread, and help breads remain fresh longer. They can usually be found in health food stores, but ascorbic acid and lecithin can also be used. Ascorbic acid (Vitamin C) can be added to help give a hint of acidity to help the rise of dough. Take a 500mg tablet, cut into four pieces, crush one of the quarters and use 1/10 of the crushed powder in a recipe. Lecithin is an emulsifier (mixer) that is found naturally in egg yolks and can help bread last longer. It can be found in a powdered form in stores. If you choose to use an egg yolk, remember to decrease liquid by the same amount.

Sugar feeds yeast, but if there is more than 1 tablespoon of sugar per cup of flour the gluten will suffer in the recipe.² Sweet breads are rare, but breads with sweet fillings exist. So, leave the sugar for after the dough has been made.

The ingredients in bread are basic and easily found in your local grocery store. What you choose to put into the bread you bake for your family is limited only by your own creativity. As the focus moves to the techniques for making bread, you may find a new and different way to make a family favorite.

Mixing Techniques for Making Bread Dough

Autolysis is a technique of hydrating the flour and water in a recipe for 15-30 minutes. Place the water and the flour in mixer, mix for about 20-30 seconds just to blend and cover with plastic wrap and let sit. Then add the remaining ingredients, mix just to form a ball. There is no need to knead the dough as the hydration process begins gluten formation. Let rise. Follow the instructions for the remainder of the recipe.

Straight dough is the traditional method of dough making. Mix the ingredients, allow the dough to rise, punch it down, shape the dough, allow it to rise again, and bake it.

Pre-ferments are a "culture" or "starter" like sourdough. As starters begin to ferment they produce acid that helps yeast work faster and longer. There are several types of pre-ferments and each is used to increase the flavor of the bread. A *sponge* is a fairly firm mixture of

yeast, flour and liquid that is allowed to stand for several hours. The *poolish* (see photo of jar with starter) is a wetter mixture with yeast and equal weights of flour and water.² Recipes will call for a starter; however a poolish can be adjusted from any recipe. Take 1/8 teaspoon yeast, 1/2 cup warm water and 1 cup of flour and mix for one minute. Cover and let sit for several hours, or overnight. In the morning, continue the bread making process, adjusting for the flour, yeast and water used. Compare the flavor of that loaf of bread to a loaf of the same recipe made without the poolish technique. This technique is best used on artisan breads that desire large holes such as cibatta and focaccia.

Baking Techniques

Probably the most important factor in determining the taste of bread is the baking technique.¹ Bread can be baked in a 350 degree dry oven for an hour for a tender crust. Or, artisan bread is most often baked in a 400-450 degree oven that gets a burst of steam from a cup of water poured into a hot baking pan at the moment the bread is put in. Hotter ovens mixed with steam produce a thicker crisper crust that crackles such as on a baguette.

Whether you bake one loaf a week, month or season, knowing the basics about ingredients and techniques allows you to experiment until you find the perfect fit for your family. The next time you are in the grocery store aisle, you can stock up on bread flour and active dry yeast, and plan to make homemade pizza, bread bowls for dip, or a loaf of wheat bread for peanut butter and jelly. Whatever you make, enjoy the pleasure that comes from making a great loaf of bread.

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²Corriher, S. O. (2008). *BakeWise*. New York, NY 10020: Scribner.

³McGee, H. (2004). *On Food and Cooking: The Science and Lore of the Kitchen* (2nd ed.). New York, NY 10020: Scribner. (Original work published 1984)



Darcy Tessman



Darcy Tessman

Hummingbirds in Arizona

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University of Arizona Cooperative Extension, La Paz County

Hummingbirds are often referred to as 'flying jewels' or 'wonders of nature' due to their striking colors, small size and unique ability to hover or even fly backwards! Male hummingbirds are generally more brightly colored than females and, amazingly, all of that dazzling color is a result of feather structure, not pigment. Hummingbirds are among the smallest birds in the world. In fact, the smallest extant bird is the Bee Hummingbird. Even the largest hummingbird weighs less than 20 grams (0.71 oz) and most weigh around 5 grams (0.18 oz).

Another distinct feature of hummingbirds is the variety of beak adaptations they have developed for obtaining nectar from an equally wide variety of flower species. Hummingbird beaks range from short to long and curved to straight and each has co-evolved with specific flowering plants that depend upon hummingbirds for pollination. These specialized flowers generally produce large amounts of nectar, providing a much needed source of food for a bird that must consume more than its own weight in nectar every day. Generally, plants adapted for hummingbird pollination do not provide any type of perch for the feeding bird. In response, hummingbirds have developed the ability to remain stationary in the air while sipping nectar, or to hover in the breeze in response to swaying flowers. This hovering is necessary for the birds to obtain sufficient nectar from their favorite flowers, many of which have long corollas (the whorl of petals usually colored to attract insects and birds).

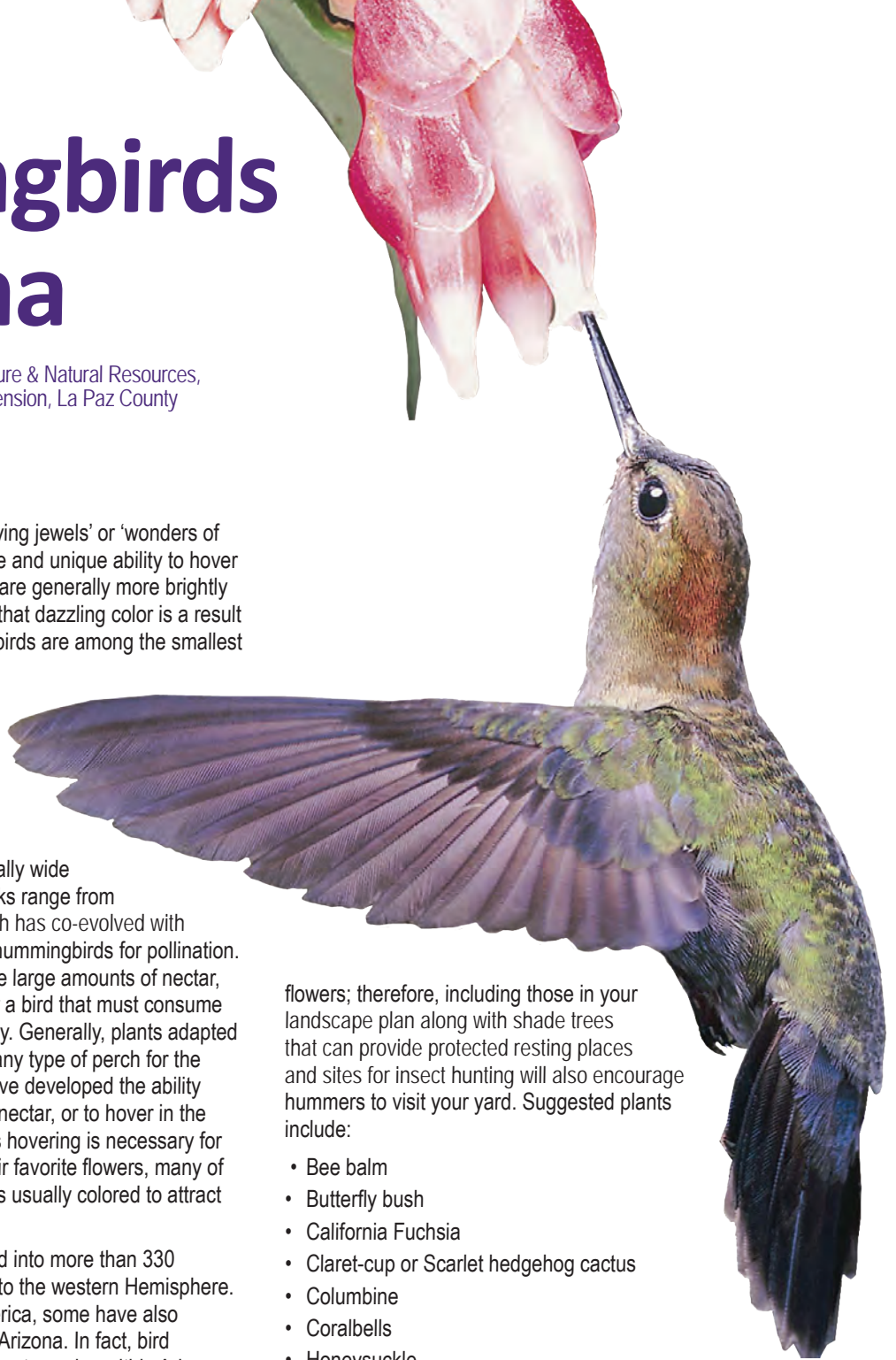
These amazing birds have been classified into more than 330 modern species whose habitat is restricted to the western Hemisphere. While most occur in South and Central America, some have also colonized parts of North America, including Arizona. In fact, bird watching groups have documented 18 different species within Arizona, more than any other state except Texas. The map shown is a combined overlay of the habitat ranges of hummingbirds that either call Arizona home or who pass through on their seasonal migrations. The 'hummers' that we see may come from as far away as Alaska or western Canada in the spring and then may migrate south to Mexico and Central America as winter approaches.

Attracting Hummingbirds to Your Yard

Because hummingbirds find flowers by sight rather than smell, it follows that the best way to attract them to your yard is to select native plants that have brightly colored flowers: red, orange or dark pink are best. Many hummingbirds co-evolved with trumpet-shaped or tubular

flowers; therefore, including those in your landscape plan along with shade trees that can provide protected resting places and sites for insect hunting will also encourage hummers to visit your yard. Suggested plants include:

- Bee balm
- Butterfly bush
- California Fuchsia
- Claret-cup or Scarlet hedgehog cactus
- Columbine
- Coralbells
- Honeysuckle
- Impatiens
- Lantana
- Lupine
- Mimosa
- Palmer's agave
- Penstemons (red/pink)
- Petunia
- Salvia species (various)
- Trumpet creeper
- Trumpet vine
- Yucca



Check with your local Extension office or Master Gardener to determine which of these plants is best suited to your location and growing conditions.

If you don't have a green thumb, you can still enjoy hummingbirds in your yard by hanging a hummingbird feeder in a safe place away from the reach of local cats and other predators. As mentioned above, hummingbirds must eat more than their weight in food each day; therefore, they must constantly search for food sources and eat often. According to research presented by Hainsworth and Wolf in *Wildbird Magazine*, a hummingbird's "survival depends critically on eating more frequently than any other animal – because of this, they continually face the danger of starving. Within a very short time at a feeder, a small, hungry hummingbird can solve its immediate requirements for food."

General Rules for Using a Hummingbird Feeder

Primary goals for backyard birders: (1) provide food to attract hummingbirds so they continue to visit, and (2) maintain feeding frequencies by altering feeder solution concentrations so that you have more birds, more often, at your feeders. If you live in an area that has distinct hummingbird seasons, you can start the season using a sweeter solution (1:3 ratio of sugar to water) in your feeder in order to encourage hummers to return to your feeder. Once you have developed a 'loyal' following, it is best to reduce that to a 1:4 or even 1:5 ratio which will encourage the birds to feed more often in order to satisfy their needs. The reduced ratio will increase your bird watching enjoyment and is better for the birds since stronger solutions may not meet the birds' water intake needs.

The color of the feeder is important. Hummingbirds are attracted by red. Do not use yellow colored feeders – you will attract bees instead.

It is true that flower nectar and table sugar contain little to no protein, or sodium and potassium salts. Not to worry; hummingbirds get most of their protein by eating small insects. Do not be fooled into using commercial "instant nectar" mixes or adding supplements. They are expensive and they may contain constituents harmful to hummingbirds. University of Arizona studies have shown that hummingbirds are unusually sensitive to dietary iron and suggest that hummingbird deaths may be due to supplements or commercial diets that didn't properly mimic the nectar found in flowers. Don't be fooled by statements that additives are approved by the Food and Drug Administration. The FDA regulates additives for human consumption: these additives have NOT been proven safe for hummingbirds.

Additional Sources of information

For free downloadable posters, go to: <http://www.birds.cornell.edu/pfw/FreeDownloads.htm>

Find Habitat maps at: <http://www.worldofhummingbirds.com/habitatmap.php>

Check out the frequently asked questions (FAQ) at the Southeastern Arizona Bird Observatory site: <http://www.sabo.org/hbfaqs.htm>

Hummingbird Nectar Recipe

Directions for making safe hummingbird food:

1. Mix 1 part sugar with 4 parts water and bring to a boil to kill any bacteria or mold present.
2. Cool the solution and fill the feeder.
3. Excess sugar water may be stored in the refrigerator.
4. Red dye should NOT be added.
5. Do NOT use honey, sugar substitutes or brown sugar – these are unnatural and unhealthy for hummingbirds.
6. Your feeder should be rinsed and refilled every 2 to 4 days. Use vinegar or a weak solution of chlorine bleach, if needed, to remove residues or mold. The feeder solution should always be changed if it become cloudy or smells fermented. This is another reason not to use dye – it will mask cloudiness.



A great video is available from PBS on their Nature page entitled: *Hummingbirds: Magic in the Air*. Click on the Video link at <http://www.pbs.org/wnet/nature/episodes/hummingbirds-magic-in-the-air/introduction/5424/> and you can watch this for free. If you love hummingbirds, don't miss this.

Two books to consider by Sheri Williamson:

Peterson Field Guide: *Hummingbirds of North America*. 2001. Houghton Mifflin Company.

Attracting and Feeding Hummingbirds. 2005. T.F.H. Publications, Inc.

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Hainsworth, R., and L. Wolf. Hummingbird Feeding. *WildBird*. May, 1993. Available at: <http://www.hummingbirds.net/hainsworth.html>. Accessed February 3, 2010.


Diagnostic Update - Wildlife. 2005. *Arizona Veterinary Diagnostic Laboratory Newsletter*. April, 2005. 10:1, pp. 6. Available at: <http://microvet.arizona.edu/AzVDL/newsletters/Apr05.pdf> Accessed January 23, 2010.

Hummingbird F.A.Q.s. Southwestern Arizona Bird Observatory Web site. 2008. Available at: <http://www.sabo.org/hbfaqs.htm>. Accessed January 11, 2010.

Legal Status of Wildlife

Cori Dolan, Program Coordinator and Bill Mannan, Ph.D., Professor, School of Natural Resources and Environment, University of Arizona

Courtesy of the NPS



Lesser long-nosed bat covered in agave pollen.

Arizona is home to many awe-inspiring and beautiful creatures. The presence of these animals and other natural amenities attract many people to our state each year. As human populations expand, they can sometimes put pressures on wildlife populations. For this reason, federal and state governments have implemented strategies to promote long-term conservation of animals, plants, and their habitats. Some laws, like the Endangered Species Act, establish strategies to prevent individual species from becoming extinct. Arizona also regulates hunting and fishing to balance use with conservation of harvested species. When living in a rural area where wildlife is more prevalent, it is important to understand what is and is not protected by law.

Endangered Species Act


The Endangered Species Act (ESA) was enacted in 1973 and authorizes the listing of species as endangered and threatened. The ESA also provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. The ultimate goal of the ESA is to prevent extinctions and recover threatened and endangered species.

Before a plant or animal species can receive protection under the Endangered Species Act, it must first be placed on the Federal list of endangered and threatened wildlife and plants. The listing program follows a strict legal process to determine whether to list a species, depending on the degree of threat it faces. An “endangered” species is one that is in danger of extinction throughout all or a significant portion of its range. A “threatened” species is one that is likely to become endangered in the foreseeable future. The Fish and Wildlife Service also maintains a list of plants and animals native to the United States that are candidates or proposed for possible addition to the Federal list. People are prohibited from “taking”, selling, or transporting listed species. “Take” is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting or attempting to engage in any such conduct. A taking includes significant habitat modification or degradation that results in death or injury to listed species as well as any actions that significantly disrupt normal

behavior patterns like breeding. There are 18 plants and 42 animals listed under the ESA in Arizona, including the Pima pineapple cactus, lesser long-nosed bat, and jaguar. If you have an endangered or threatened species near or on your land, contact the Fish and Wildlife Service (FWS) to find out more about them. The FWS is committed to working with landowners to conserve habitat while minimizing land-use restrictions for homeowners. In some instances the FWS can even provide incentives to landowners to protect habitat. Contact your local FWS office for more information.

The Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) protects selected species of birds and provides for closed and open seasons for hunting game birds. The MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg of any such bird, unless authorized under a permit issued by the Secretary of the Interior. The MBTA protects over 800 species of birds nationally. A list of species protected under the MBTA can be found at www.fws.gov/migratorybirds/intrnltr/mbta/mbtandx.html, and includes raptors such as burrowing owls and peregrine falcons, as well as their nests. The FWS offers guidelines and recommendations to advise landowners about human activities that may pose a conflict or disturb protected birds. For example, you may not move or collect nests, feathers or bird parts from a protected species that you find on your property. Contact your local FWS office for more information.



Southwestern willow flycatchers are protected under the Migratory Bird Treaty Act.

Courtesy of Utah Department of Natural Resources



A license is required for hunting wildlife species in Arizona.

Hunting and Permits

Arizona offers a diverse array of hunting and fishing opportunities. The Arizona Game and Fish Department is responsible for the management of Arizona's wildlife and does this in part by regulating hunting and fishing. They use current data on the health of wildlife populations to define the times (seasons) and methods of taking wildlife and possession and bag limits. A valid Arizona hunting or fishing license is required for taking wildlife on public and private land in Arizona. Wildlife includes all wild mammals, wild birds, reptiles, amphibians, mollusks, crustaceans and fish. Arizona residents and non-residents over the age of 14 need a valid hunting license to hunt in Arizona. A person under 14 may hunt wildlife, other than big game, without a license when accompanied by a properly licensed person 18 years or older. Licenses can be purchased at your local Arizona Game and Fish Department Office or one of 300 license dealers in the state. Below is a table listing some examples of the species that are considered game species and can be hunted with a permit. Information on these and other species (including fish) that require permits can be found at www.azgfd.gov/h_f/hunting.shtml. A fishing license is not required to take aquatic wildlife from private waters that are not open to the public and not managed by the Department. A valid fishing license is required for taking any aquatic wildlife, including amphibians or soft-shelled turtles, from public waters.

Protected Species

Not all wildlife is allowed to be hunted or collected. In Arizona, it is unlawful to possess, kill, harass, hunt, or handle, wildlife that is protected by state or federal law without proper permits (ARS Title 17). Federal laws like the ESA are overseen by the U.S. Fish and Wildlife Service (www.fws.gov) and Arizona state laws are overseen by the Arizona Game and Fish Department (www.azgfd.gov). Reptiles and amphibians under protection in Arizona include the Gila monster, desert tortoise, flat-tailed horned lizard, twin-spotted rattlesnake and several leopard frog species. Other species in Arizona protected by federal laws

include the Sonoran pronghorn, Mexican gray wolf, masked bobwhite quail, and Southwestern willow flycatcher. Certain activities on private lands that require federal permitting (e.g., filling or dredging creeks or washes) or federal funding may require the appropriate federal agency to evaluate their responsibility to threatened and endangered species. Landowners with endangered species habitat should anticipate such reviews and are encouraged to contact the FWS early in their project planning. To learn more about laws protecting wildlife and hunting guidelines see the following resources.

AZ Threatened and Endangered Species
www.fws.gov/southwest/es/arizona/

Migratory Bird Program
www.fws.gov/migratorybirds

Arizona game species
www.azgfd.gov/h_f/hunting.shtml

Threatened Species Lists by County
www.fws.gov/southwest/es/arizona/Threatened.htm#CountyList

Endangered Species Act of 1973
<http://epw.senate.gov/esa73.pdf>

ARS Title 17
[www.azleg.state.az.us/ ArizonaRevisedStatutes.asp?Title=17](http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp?Title=17)

WLDLIFE THAT CAN BE HUNTED WITH A PERMIT

Waterfowl

American Wigeon
Blue-winged Teal
Ruddy Duck
Green-winged Teal
Bufflehead
Redhead

Big Game

Antelope
Javelina
Elk
Merriam's Turkey
Desert Bighorn Sheep
Mule Deer

Small Game

Band-tailed Pigeon
Blue Grouse
Sandhill Crane
Cottontail Rabbit
Pheasant
White-winged Dove

Predators

Bobcat
Coyote
Foxes
Skunks

Nutrition for Senior Horses

William A. Schurg, Ph.D., Professor and Cooperative
Extension Equine Specialist, Animal Science
Department, University of Arizona



Michael D Skelton

The most notable change in an older horse is the visible sight of condition loss. There is a combination of factors both physiological as well as psychological that must be understood in order for us to develop a feed program to meet the horse's special needs.

An article written in *The Horse* (February, 1997) by Aleta Walther listed the physical signs of aging to include: arthritis-related lameness, tooth loss, loss of appetite and vigor, weight loss and/or poor condition, protruding withers, and graying of hair appearing around the ears, eyes, and forehead. Furthermore, other problems not so easily recognized are anemia, increased blood sugar, pituitary and/or thyroid dysfunction, and kidney, liver or respiratory failure. Digestive disorders related to prior parasite damage, reduced activity, and reduced intestinal motility also may occur. Cornell University reported that the primary categories of problems among horses 15 years or older presented to their veterinary clinic were: digestive, lameness, tumors, respiratory disease, eye problems, reproductive disorders, parasitism, and tooth troubles. Using these types of categories it is wise to develop a baseline assessment of current health status to help you ultimately recognize changes when they occur. As with any animal, the aging process increases aches and pains. We just need to recognize changes and not over do our exercise programs and optimize our nutritional and health care programs to continue the usefulness of our aging companions.

It is important in any equine animal to get the most out of what is offered as food. If an animal cannot ingest it, chew it, or digest it, even the "best" foodstuff is no good. One of the first things that will impair the older horse from using its feed is dental health. The aging process causes teeth to wear down and the grinding surfaces cannot break down foodstuffs appropriately. This is especially true among grazing horses who no longer can effectively bite pasture or if the forage is too tough or coarse to chew, hurting their mouths. The development of hooks on the molar teeth can be a problem through most of the horse's life; however annual dental evaluations and "floating" of teeth can improve the situation. Older horses may actually lose teeth or have dental abscesses that create a sore mouth. Any of these situations may cause the horse to have a loss of appetite. Once we understand the dental health of the horse, appropriate dietary solutions can be implemented.

The metabolism of the older horse changes and is somewhat slower than a younger horse, which should equate into the need for less nutrients and intake of feedstuffs. However, due to numerous other factors, geriatric horses suffer from decreased digestive efficiency,

which means that the gastrointestinal tract cannot or does not have the ability to process and extract nutrients from feed. Therefore, as the horse ages, the nutrient need densities may actually increase over what they were for the younger horse. Digestion of fiber decreases and the motility of the intestinal tract is lessened. Older horses do not absorb protein or phosphorus as well either, thus compromising repair of soft tissue and bones or reducing the resiliency of bone. If the hind gut is not working appropriately, then the manufacturing of B vitamins may also be compromised, leading to immune system disorders and increased viral infection susceptibility.

Senior horses generally will be less aggressive, and if fed in group settings may not be able to compete with younger horses for the available feed and ultimately lose weight or condition. Older horses likewise do not handle extremes of environmental changes due to the fact that they have a harder time maintaining their internal temperature. Under cold stress situations older horses may need to be fed at 120% of the National Research Council's recommendations for daily feed intake. The use of blanketing and having a wind break are essential to the comfort and well being of the older horse. Under heat stress conditions horses may lose their appetites too. So body clipping horses, providing mist systems, and fans or coolers may be necessary to keep the animal comfortable and willing to eat. Under both cold and hot environmental conditions it is essential that the horse maintain an adequate water intake. Lack of water intake has a direct effect on consumption of feed and increased incidences of colic.

The dietary recommendations center around designing a program that provides for an ease of chewing, improved digestibility of nutrients and increased palatability. It is important to provide the horse with high quality forage. It needs to be easy to chew. Mature and stemmy hay that is coarse should be avoided. If you have been using an all grass hay it may be advisable to blend the hay with about a 60% legume content type hay. Older horses will find that easier to chew. One test is to grab a handful of hay and squeeze hard. If the hay hurts your hand, it is probably too coarse and fibrous for the older horse. Do not feed all high quality alfalfa hay since the level of protein may be detrimental to the older horse. Older horses have trouble retaining nitrogen and put extra stress on the kidneys and urinary tract. If the horse cannot tolerate any type of longstem hay, you may want to go to a chopped hay, cubes or pellets that can be moistened to soften the fiber and aid palatability.

The use of beet pulp is another excellent source of fiber for aging horses. Once soaked, it's soft and very easily consumed by the horse.

Beet pulp is an excellent source of digestible nutrients and a very good source of calcium. Whole grains may not be able to be broken down by the older horse, therefore rolling, steam flaking, extruding and/or pelleting may be appropriate actions. Soaking grains in warm water aids in palatability and will provide the older horse additional water intake.

The older horse has needs very similar to the weanling in terms of protein quality and mineral nutrition. Many feed companies have developed the "Senior" lines of feeds that have a softer textured pelleted format which improves palatability. The use of added dietary fat in the form of corn oil or rice bran appears to be a way to increase energy density and improve palatability. Top dressing vegetable oil to a level of up to two cups per day (spread over several feedings a day) is an excellent way to improve intake. Many feeds are formulated with added fat. Look on the feed label and see that the feed tag shows at least 5-8% fat level. If you feed rice bran as a source of fat make sure that it has added calcium since rice bran is very high in phosphorus. If your hay quality is questionable, then the use of the complete

senior diet may be an option. If you need to add additional protein to the horse's diet, the use of soybean meal will provide additional high quality protein and only needs to be added in very small amounts. The use of brewer's yeast and some of the new probiotics also may be supplemental additives that will be beneficial to the older horse. Older equines may also benefit from additions of vitamin C and the B complex vitamins since they are not capable of manufacturing their own within the hind gut.

Horse owners need to be willing to try many different things to find the right mix for the older horse. No one feed program will be specifically beneficial to all horses. Remember each horse is an individual. If your horse becomes a finicky eater, be willing to modify his diet. Feed smaller meals more often, be sure that he is drinking plenty of clean fresh water, and find the right presentation of feedstuffs to interest him. We can manage the feed and the environmental aspects to allow the horse to be healthy and useful for many years to come.

Order Form

cals.arizona.edu/backyards/

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