

Goat Pasture and Browse - A Permaculture Approach to Raising Healthy, Productive Goats

By Chrys Ostrander for the 1st Spokane Permaculture Design Course, 2012, Michael Pilarski, Instructor

Goats are technically browsers (more similar to deer than cows which are grazers). Despite the common practice of running goats on grass/legume pastures (or feeding them hay in corrals), goats will prefer browse if given the choice. They like the mineral content and higher tannin content of deciduous and evergreen foliage, in fact, their metabolism requires more mineral than grazing ruminants for their health, especially reproductive health. A mixture of pasture and browse will ensure health and productivity with goats, especially if the pasture has more diversity than most grass-legume or straight grass pastures you see.

How to Achieve Greater Diversity in Pasture for Goats

Goat pasture can be perennial, annual or a mix of both, but the best goat pasture is a mix of grasses (at lower density than a cow or horse pasture), pulses (legumes) and a great diversity of forbs. A forb (sometimes spelled phorb) is an herbaceous flowering plant that is not a graminoid (not a grass, sedge or rush). Forbs in goat pasture can include wildflowers, weeds and chosen varieties including natives and introduced species.

An existing pasture with perennial grasses at a high density more appropriate for grazing ruminants can be renovated for goats by varying degrees of soil disturbance in the early spring followed by seeding desired varieties. Soil disturbance can be accomplished either by spring-toothed harrow, disc harrow or plow, depending on the degree of knock-back of the grasses that is desired.

A seed mix of annual and perennial forbs and legumes, perhaps blended a low percentage of more desirable species of perennial grasses (or even annual grass like oats), can be broadcast and then raked or rolled in. One possible strategy is to make seed pellets using your desired seed mix as this could negate the need to rake or roll in the broadcast seed and avoid bird and rodent seed predation while providing good soil-seed-moisture contact to aid germination. Seed pellets could possibly negate the need for soil disturbance in some cases. Seed pellets can easily be made with soil or subsoil mixed with water into a thick mud and mixed with seed. Force this mud-seed mix through a 1/2" hardware cloth screen and lay the resulting pellets out in a dry area to harden.

The same type of strategy can be employed to renovate a straight alfalfa field into pasture more suitable for goats. One area of study would be to experiment with forb species to mix with alfalfa or alfalfa-grass hay fields and cut with the hay to be baled with the hay. Close attention would need to be paid to differing rates of drying of the various species in the hay/forb mix, but if it could be developed, such hay would be far more beneficial a winter ration for goats than grass-alfalfa mix alone.

Annual Goat Fodder

One very good family of forbs to include in goat fodder is the Brassica family (See Attachments: *Brassica Fodder Crops for Fall Grazing* and *Diversifying Forages at the Stoltzfus Farm*).

Also see:

Forage brassicas –quality crops for livestock production

Agfact P2.1.13, first edition 2002

Linda Ayres, District Agronomist, Orange

Bruce Clements, District Agronomist, Bathurst

Published by New South Wales Agriculture 2002)

and

Fertility Pastures - Herbal leys as the basis of soil fertility and animal health

by Newman Turner

Full book available on-line at:

http://www.journeytoforever.org/farm_library/turner2/

Brassicas used as forage include root crops, leaf crops and crops that are grown for both root and leaf crops.

Roots such as turnips and rutabagas are grown separately and are not grazed by the goats while being grown. They are usually harvested and stored where they will not freeze in the winter; in root cellars, basements, even holes in the ground where the roots are covered with a thick layer of straw.

Fodder beets (these are spinach family, not brassica family) are also commonly grown for goat fodder. The Mangel beet (*Beta vulgaris*) is a common fodder beet and in good soil can grow very large.

Goats lack top teeth in the front. They cannot easily eat tough root crops without the roots being chopped into fairly small pieces or shredded. This preparation should occur right before the roots are fed to the goats since chopped or shredded roots will rot if prepared too long before feeding.

Leafy brassicas such as kales and Canola can be grazed if allowed to grow undisturbed to adequate size. One strategy is to sow leafy brassicas at such a time so that they are the correct maturity to be grazed in late fall or early winter when other pasture fodders are spent or dormant since brassicas hold up to cold weather very well. They can also be fed using the cut and carry method.

With careful management, leafy brassicas can be inter-seeded with other annual and perennial forbs in grass or grass-alfalfa pasture when renovating a pasture for goats.

Perennial Browse

"In 2001, producers Kristan Doolan and George van Vlaanderen of Does' Leap Farm in Vermont conducted a Northeast SARE project comparing the production of dairy goats that either grazed pasture or browsed in a wooded area. In that experiment, the goats that browsed produced more milk and had longer lactations. The investigators concluded that browse is at least as nutritious as pasture, and that the shade in the browse areas helped keep the does cooler, which also helped production. The full article was published in The Dairy Ruminant Newsletter and then re-printed in CreamLine, Winter 2002 issue." Source: ATTRA *Dairy Goats: Sustainable Production*

Goats will eat the leaves, new growth twigs and bark of many shrubby plants. It's likely that goats that are free in the wild will nibble and move on like deer, leaving the shrubs in good condition after feeding (in fact, better condition for growing fodder as a result of the pruning that happens and that stimulates regrowth). Kept goats must be managed when browsing so as not to damage the shrubs because kept goats are usually confined or they may prefer to stay near their humans. Fences can delimit paddocks for managed rotational browsing. Because goats do eat browse, living fences, if employed, must be of the utmost density and maturity to remain useful. A separate project would be to determine the best species for containing goats within living fences.

Fodder Hedge - A hedgerow that can either be browsed by the goats with close management to avoid over-browsing or managed as a cut and carry hedge where boughs are brought to the goats.

Managed Browsing - Goats are allowed prescribed times to browse shrub covered paddocks (in which grasses, forbs and pulses are also growing). They are pulled off or moved to another paddock before the amount of browsing becomes damaging to the shrubs.

Cut and Carry: Boughs of shrubs are cut, collected and brought to the goats. This can include boughs from the farm or the farm's nearby surroundings, neighbors, state land (where allowed) and the like.

See attached photograph showing "Hazel Scrub" perennial browse.

Fodder Shrubs

+ Advantages of fodder shrubs.

Fodder shrubs provide a permanent cover to the rangeland. This protects the soil and helps to reduce erosion.

Fodder shrubs represent many years of growth. They provide a more stable feed supply to livestock. The animals can survive during drought on the accumulated growth of previous years.

+ Disadvantages of fodder shrubs.

The overwhelming disadvantage is cost [of original establishment].

Source: http://www.drylandfarming.org/Farming_Zones_in_WANA/Rangeland/Farmers_Ext_Range/Rangepasture.html

Perennial Browse Species (N = Native)

Caragana arborescens - Pea Tree

Caragana brevispina

Origanum vulgare - Wild Marjoram

Corylus avellana - Hazel

Corylus maxima - Hazel

Crataegus arnoldiana - Arnold Hawthorn

Crataegus laciniata - Oriental Hawthorn

Crataegus monogyna - Common Hawthorn, Oneseed Hawthorn

CRATAEGUS PINNATIFIDA - Large Chinese Hawthorn (Large 1.5" fruit)

CRATAEGUS ALTAICA - Altai Hawthorn

Gorse is a leguminous plant related to the pea and has green leaves late fall and into winter.

Common Gorse (*Ulex europaeus*)

Western Gorse (*Ulex gallii*)

Dwarf Furze (*Ulex minor*)

Jerusalem artichoke (*Helianthus tuberosus*)

Virginia creeper (*Parthenocissus quinquefolia*)

Ceanothus sanguineus -Chapparal

Cydonia oblonga - quince

Fodder Galega, Goat's Rue (*Galega orientalis*)

PRUNUS BESSEYI - Western Sand Cherry

Bladder Pod (*Sesbania* SPP???, *Croatalaria* SPP????)

A native to Asian countries such as India, Malaysia, Indonesia and the Philippines where it is commonly seen growing on the dikes between rice paddies, along roadsides and in backyard vegetable gardens. Most *Sesbania* spp can be described as soft, semi or slightly woody, 1-4 m tall perennial nitrogen fixing trees.

<http://www.ienica.net/crops/sesbania.htm>

Some *Sesbania* is said to be poisonous to humans and livestock.

Moist site plants:

Black Hawthorn/*Crataegus douglasii* N
Black Twinberry/*Lonicera involucrata*
Blue Elderberry/*Sambucus cerulea* N
Chokecherry/*Prunus virginiana* N
Douglas Maple/*Acer glabrum douglasii*
Flat Top Spirea/*Spiraea betulifolia*
Hardhack/*Spiraea douglasii*
Mountain Alder/*Alnus incana* ssp. *tenuifolia*
Mallow Ninebark/*Physocarpus malvaceus* N
Pacific ninebark or tall ninebark/*Physocarpus capitatus* N
Nootka Rose/*Rosa nutkana* N
Paper Birch/*Betula papyrifera*
Prickly Rose/*Rosa acicularis*
Red Elderberry/*Sambucus racemosa*
Red-osier Dogwood/*Cornus stolonifera* N
Sitka Alder/*Alnus sinuata*
Thimbleberry/*Rubus parviflorus* N
Trembling Aspen/*Populus tremuloides*
Blackberry/*Rubus* SPP

Dry site plants:

Common Juniper/*Juniperus communis*
Mock Orange/*Philadelphus lewisii*
Ocean Spray/*Holodiscus discolor* N
Red Stem Ceanothus/*Ceanothus sanguineus*
Saskatoon/*Amelanchier alnifolia*
Snowberry/*Symphoricarpos albus*
Snowbrush/*Ceanothus velutinus*
Soopolallie/*Sheperdia canadensis*
Spreading Dogbane/*Apocynum androsaemifolium*
Sumac/*Rhus glabra*
Tall Oregon-grape/*Berberis aquifolium* N
MALUS BACCATA (Siberian Crab apple)
PARTHENOCISSUS QUINQUEFOLIA (Virginia Creeper/American Ivy)
LONICERA TATARICA (Tatarian Honeysuckle)
ROBINIA FERTILIS (Bristly Locust)
Lilac (*Syringa* SPP)

Other Palatable Trees and Shrubs

Apple
Maples

Dogwood Cornus
Hawthorn Crataegus
Oaks Quercus (acorns in moderation, not red leaved species)
Elm Ulmus
Willow, Poplars
Honey Locust
Black Locust
Bristly Locust (Robinia hispida)
Plum (Some sources advise avoiding freshly wilted plum foliage in feed as it may contain concentrations of hydrocyanic acid otherwise known as cyanide. There are other Cyanogenetic Plants, but some are also listed as common goat forage, so the severity of this risk has yet to be fully determined)
Hackberry - Celtis occidentalis
Mulberry - (Moraceae SPP)
Pinus SPP

Edible & Poisonous Plants for Goats

People have often asked goat expert Molly Nolte of Fiasco Farm (www.fiascofarm.com) to share a listing of edible & poisonous plants for goats, but she has tended to hesitate to make a list of plants you can, or shouldn't feed, to goats because there is no possible way anyone could know all plants that are poisonous to goats. Molly Nolte may know most about plants in her own area (East TN, USA), but there may be plants in places such as CA, England and Australia that she does not know, and could mistakenly not add to the list. She prefers not to bear responsibility if a goat gets poisoned because she did not list the plant the goat was fed.

Molly Nolte has seen many "Poisonous Plant Lists" on the Internet that listed plants that she knows for a absolute fact are NOT poisonous to goats because her own goats eat them (such as English Ivy, which they love). Someone said they had a list that said St. John's Wort was poisonous to goat, which is isn't. You just cannot believe, as gospel, everything you read, especially on the Internet. Please always research and make sure to check and verify your facts.

Because goats are naturally browsers, even if you have poisonous plants on your property, very often, if they have plenty of "safe" browse, they rarely eat enough bad stuff to cause any real harm. For example, Nolte has Nightshade growing on her property, but her goats have plenty of other things to browse upon, so they never touch the Nightshade.

Never make big changes in the way you feed a goat all at once, or feed large quantities of a new food that the goat has never had before. If you do this, you can throw off the bacteria in the goat's rumen, which can cause the goat to bloat, or the rumen to shut down. When changing a goat's diet, do so slowly, to give the bacteria in the rumen time to adjust.

LISTING OF EDIBLE & POISONOUS PLANTS IN GOATS

From: <http://fiascofarm.com/goats/poisonousplants.htm>

Please remember, this is not a complete listing and no responsibility is assumed for it's accuracy.

You may note that some plants actually appear in both lists. This is because different people with different information have contributed to the list This just shows how any list can be inaccurate.

<p style="text-align: center;">EDIBLE</p> <p>Please note, too much of anything can be bad, so ALL plants, even if in this Edible listing, should be fed only in moderation.</p>	<p style="text-align: center;">POISONOUS</p>
<ul style="list-style-type: none"> • Acorns (in moderation) • Agapanthas • Althea • Angel Wing Bigoneas • Apple • Arborvita • Avocado*- Mexican Avocado leaves/trees such Pinkerton <i>might</i> not be (*note-South American Avocado leaves ARE poisonous) • Bamboo • Banana, entire plant, fruit & peel • Barkcloth fig (ficus natalensis) • Bay Tree Leaves green and dried • Bean (all parts) • Beets, leaves and root • Blackberry bushes (all parts) • Black Locus (we had quite a few of these until our goats ate them all) • Bramble • Broccoli (all parts) • Buckbrush (aka coralberry or indian currant) • Cabbage • Camellias • Cantaloupe: fruit, seeds and peel 	<ul style="list-style-type: none"> • African Rue • Andromeda (related to foxglove) • Avocado- South American Avocado leaves/tree such as Haas or crosses with Haas • Avocado- Fuarte (definitely) • Azalea • Brouwer's Beauty Andromeda • Boxwood • Burning Bush berries • Calotropis • Cassava (manioc) • China Berry Trees, all parts • Choke Cherries, wilting especially • Choke Cherry Leaves in abundance • Datura • Dog Hobble • Dumb Cane (diffenbachia) (Houseplant) • Euonymus Bush berries • False Tansy • "Fiddleneck"- know by this common name in CA. It is a fuzzy looking, 12" to 15" plant, with small yellow blossoms, shaped on a stem shaped like the neck of a fiddle. • Flixweed

- Collard Greens
- Carrots
- Catnip
- Cedar Needles (leaves) & Bark
- Celery
- Citrus
- Clover
- Corn husks & silk
- Cottonwood
- Coyote Bush (Baccharis)
- Dandelion
- Douglas Fir
- Dogwood
- Elm
- English Ivy (we feed ivy trimming all the time; they love it)
- Fava Bean pods
- Fern
- Fescue grass
- Ficus
- Garlic
- Ginger Root
- Grape, entire plants
- Grape Vine
- Grapefruit, fruit & peel
- Greenbrier
- Hay Plant
- Heavenly Bamboo
- Hemlock Trees (which are not the same as the poisonous hemlock, an herbaceous species of plant which is in the carrot family that bears the scientific name "Conium maculatum")
- Hibiscus
- Honeysuckle, entire plant (goats love

- Fusha
- Holly Trees/Bushes
- Ilysanthes floribunda
- Japanese pieris (extremely toxic)
- Japanese Yew
- Lantana - appears on both lists
- Larkspur- a ferny, flowering plant in shades of blue, pink and white.
- Lasiandra
- Lilacs
- Lily of the Valley (Pieris Japonica)
- Lupine - appears on both lists: Seeds are the part of the plant that are the greatest problem.
- Madreselva (Spain) patologia renal
- Maya-Maya
- Monkhood
- Milkweed
- Mountain Laurel
- Nightshade- appears on both lists: Whether this is really poisonous is questionable because I have received a post saying "my goats eat nightshade all the time". We also have a lot of Nightshade on own property and none of our goats have died from it. I tend to think it is ok in moderation.
- Oleander
- Pieris Japonica (extremely toxic)
- Red Maples
- Rhododendron
- Rhubarb leaves
- Tu Tu (the Maori name for Coriaria arborea)
- Wild Cherry, -wilted- leaves (fresh and fully dried are not poisonous)
- Yew

honeysuckle)

- Hyssop
- Ivy
- Jackfruit leaves
- Jade
- Jambolan leaves
- Japanese Elm
- Japanese Knotweed aka: polygonum cuspidatum aka: fallopia japonica.
- Japanese Magnolias (blooms/leaves)
- Johoba
- Kudzu
- Lantana - appears on both lists
- Lilac bark /branches
- Lupine - appears on both lists: Seeds are the part of the plant that are the greatest problem.
- Magnolia Leaves green and dried
- Mango leaves
- Manzanita (Arctostaphylos)
- Maple Trees, leaves & bark - (goats will readily strip the bark and kill the tree)
NOT Red Maples (Red Maples can be toxic)
- Marijuana-in moderation
- Mesquite
- Mint
- Mock Orange
- Monkeyflower (Mimulus)
- Mountain Ash (excellent goat forage tree)
- Morning Glory
- Moss
- Mulberry (entire plant)
- Mullein
- Mustard

- Nettles
- Nightshade - appears on both lists:- I have received a post saying "my goats eat nightshade all the time". We also have a lot of Nightshade on own property and none of our goats have died from it.
- Lemon Grass
- Oak Tree Leaves
- Okara- pulp left over after making Soymilk
- Onion
- Orange, fruit & peel
- Paloverde - needles & seed pods
- Patterson's Curse
- Pea Pods
- Peanuts, including the shells
- Pear
- Pencil cactus
- Peppers
- Pepper plants
- Photinia
- Pine Trees (we had hundreds of small trees until our goats ate them all)
- Plum, all
- PrivetPumpkin
- Poison Ivy
- Poison Oak
- Poison Sumac, the vine
- Pomegranates
- Poplar Trees
- Potatoes
- Raisins
- Raspberry, entire plant (goats loves raspberry)
- Red-tips
- Rose, all, entire plant (goats loves roses)

- Rhubarb Leaves
- Salvation Jane
- Sassafras
- Southern Bayberry (myrica cerifera)
- Spruce trees
- Sumac, the tree
- Sunflowers
- St. John's Wort (can cause sun sensitivity in light skinned goats)
- Strawberry
- Sweet Gum Trees
- Sweet potato leaves
- Tomatoes (cherry tomatoes make wonderful treats)
- Tomato plants- in moderation (mine eat them with no problems)
- Tree of Heaven
- Turnips
- Yaupon Holly (Ilex vomitoria)
- Yarrow
- Yellow Locus
- Yucca
- Vetch
- Virginia Creeper
- Wandering Jew
- Watermelon
- Wax Myrtle (myrica cerifera)
- Weeping Willow
- Wild Rose, entire plant (goats loves roses)
- Wild Tobacco

Some sources advise avoiding freshly wilted plum foliage in feed as it may contain concentrations of hydrocyanic acid otherwise known as cyanide. There are other Cyanogenetic Plants, but some are also listed as common goat forage, so the severity of this risk has yet to be fully determined

Trees and Shrubs to Avoid

Maples – red leaved Acer
Avocado
Azalea
Tutu - Coriaria
Holly Ilex
Golden rain tree - Laburnum
Oleander
Pieris
Rhododendron
Yew - Taxus

These plants have a known toxicity to goats. See attached article, *Info 28: FODDER FOR GOATS* to understand more fully the factors that can cause poisoning.