

COMMUNITY ALLIANCE WITH FAMILY FARMERS

Grazing Sheep in Vineyards: Pennyroryal Farm



Situated in Boonville, in Mendocino's Anderson Valley, Pennyroryal Farm offers a modern picture of a diversified farm. On Pennyroryal's 23 acres of Pinot Noir and Sauvignon Blanc vineyards, owner Sarah Cahn Bennett grazes a flock of Babydoll Southdown sheep. The sheep are not only useful for managing the interplanted cover crops—they also offer a number of other benefits: reduced labor and tractor passes, weed control, fire mitigation, and a positive impact on the vineyard's soil health.

Anderson Valley, once a booming sheep farming region, has seen the business decline in recent decades. Bennett and her family have been in the business of sheep husbandry and wine production for nearly fifty years and plan to continue.

GETTING TO KNOW PENNYROYAL FARM

Her parents started the neighboring Navarro Vineyards in 1973, and by 1980 they had completely phased out synthetic herbicides and pesticides. Today Sarah helps manage both operations.

Sarah wears several hats at Pennyroyal Farm and Navarro Vineyards, where she acts as a viticulturist, livestock manager, and business partner. She received formal training in Viticulture and Enology from UC Davis and has years of experience managing sheep under her belt.

While studying at Davis, she met Ericka Mackenzie Chapters, who has a background in cheesemaking and animal husbandry, and together they envisioned what a diversified operation with fewer external inputs could look like. Pennyroyal Farm is the result of that vision. Today, Chapters manages the farm's breeding program, dairy, and creamery which produces raw milk and small batch sheep and goat cheeses in a gravity-designed facility. With the estate wines Pennyroyal produces, they have created a successful wine & cheese club and on-site tasting and farm tour experience.

The design and management of the farm and vineyards aims for a closed loop system through the integration of livestock in its vineyards and vegetable crops.

While a more mobile flock of sheep and chickens are grazed in the vineyards seasonally, leaving their manure behind, the more centralized dairy animals create layers of manure, bedding, and alfalfa stems in the loafing areas of the tour accessible barn, providing feedstock for the farm's compost operation. This compost is then used to enrich the farm's small scale vegetable production for the farmstead kitchen, in addition to amending the vineyard soils and hay fields. As the sheep graze, they provide co-benefits of cover crop management in addition to others.





KEY BENEFITS OF SHEEP INTEGRATION IN VINEYARDS

Sarah views managing both the sheep and the vineyards as helping to create a balance between animal health, rangeland health, and labor expenses. Several key benefits she shares are:

REDUCED LABOR:

Hand labor has been reduced as the sheep are used for suckering (removing unnecessary shoots) and they've completely cut out one to two suckering passes. The understory grazing cuts back tractor passes by about 25%. Although they don't use the sheep for defleaving and hedging, other vineyards successfully do so.

WEED CONTROL:

Sheep can provide effective weed control. This is especially important given the operation's choice not to use pre-emergent or synthetic herbicides, and given the time and labor that would otherwise be required. While some under vine cultivation is still needed, the sheep significantly reduce the vegetation at the base of the vines, allowing the implements to be much more effective with one pass.

FIRE MITIGATION:

"With how much fire has become a threat for California, I'd be terrified if we didn't have the grazing program", Sarah explains. The sheep aid in fuel load reduction on the rotationally grazed pastures and rangeland adjacent to the vineyards.

COVER CROP MANAGEMENT:

On cold, wet years the height of a vigorous cover crop can increase the potential for frost damage by blocking the coldest air from settling below the newly emerging buds. Often the soil is still too wet to

get tractors in to mow the cover crops, but the sheep can be turned into these blocks and quickly reduce the cover crop enough to avoid the need for frost protection (wind machines or sprinklers).

SOIL HEALTH BENEFITS AND FERTILITY:

The combination of sheep grazing, cover cropping, and compost application has contributed to higher organic matter content in the vineyards compared to the neighboring pastures. These practices contribute to greater water holding capacity and overall health of the soil for high production and quality fruit in the vineyards.

REDUCED ECOLOGICAL FOOTPRINT

By reducing their tractor passes and diesel use, as well as making compost on-farm with manure, they have lowered their fossil fuel inputs.

Vineyard Setup

In Pennyroyal's vineyards, the vines are trellised to allow for the short-statured Babydoll sheep to graze in the vineyard after the vines begin to grow. They employ a system that is a hybrid between a Lyre (or U-shaped) trellis and a T-trellis with extra cross arms and vertical shoot positioning. Measuring at about 35 inches, they allow for adequate distance between the sheep and the vines. In Navarro's 90 acres of grapes and flatland vineyards, they mainly utilize a modified T-top system with more catch wires at 35-45 inches high.





GRAZING WITH BABYDOLL SOUTHDOWNS

Babydoll Southdown sheep are a small statured breed (18-24 inches at the shoulder) originating in England. They tend to be quite portly and docile. Because of their efficient metabolisms, they are not aggressive eaters and tend not to go to any extra effort to reach grape vines growing above their heads, while their taller and less thrifty ovine counterparts will often climb or stand on their hind legs to eat grape leaves and shoots in the main canopy of the vineyard which can be incredibly detrimental to a wine grape crop.

Initially, Sarah leased a small flock of Babydoll Southdowns to trial grazing them in her vineyards; she was impressed with how efficiently they suckered the vines and ate the shoot tips while leaving the main canopy untouched. She then began to purchase breeding stock from a number of small breeders around the country to grow her own flock.

She now breeds Babydoll Southdowns in addition to Dorset, Panama, and Texel sheep that have been interbred to create a mid-sized standard flock of grazers. With a current flock of 140 Babydoll ewes, and about as many crossbred ewes, she has the ability to mob graze larger sections of rangeland and vineyard cover crop with the whole flock. Depending on the time of year, the Babydolls split off to graze and sucker in the vineyards after bud break while the crossbred flock targets other areas outside the vines.

TIMING OF GRAZING AND CONSIDERATIONS

Sarah carefully decides which blocks are grazed each year, and rotates annually rather than grazing all of Pennyroyal and Navarro's acreage. Mob grazing with the Babydolls and standard sheep together allows her to mow down an aggressive cover crop in a vineyard block in a matter of days. By grazing later with the Babydolls only, targeted vegetation management can be achieved.



TIMING OF GRAZING AND CONSIDERATIONS

The passes and timing of the sheep in the vineyard are as follows:

First Pass>

Full-sized sheep and Babydolls mob graze the cover crop in late February or early March depending on the year and weather. At this time the whole flock can effectively reduce weeds around the base of the vines. In blocks where winter weed pressure is high, vineyard rows are mowed to reduce forage in-row and target weed management under the vines.

<..... Second Pass

After the buds start pushing out in late March the Babydolls and their lambs are grazed exclusively to manage cover crop regrowth. As the vines continue to grow and produce suckers, the Babydolls can be left in to manage sucker growth. Lambs will be weaned at this point. Growing lambs are more agile and aggressive consumers, tending to climb into the main canopy to eat grape leaves. During this period the sheep are removed to holding paddocks outside the vineyard during spraying.

Third Pass>

A small group of Babydolls are brought out again prior to veraison for spot suckering in mid to late summer.

During mob grazing, a total of 240 ewes are grazed, or 400 sheep total including lambs. This amounts to a stocking rate of about 200 sheep for every four to five acres. Ideally, Sarah mentions that she would graze with a rate of 100 head per acre. To provide adequate feed and avoid compaction, the sheep are moved every few days to one week.



THE FINER DETAILS OF GRAZING IN VINEYARDS

When deciding on timing and duration of grazing, a number of elements are considered. The timing of bud break and when the vines leaf out are taken into account, as is the trellising system and vine height. At Pennyroyal, Sarah can keep the sheep in the vineyard during and after bud break due to the higher trellises. Even if the sheep aren't yet interested in eating the buds, they can knock them off as they pass through the vines with lower trellis styles. The amount of available forage and cover crop is also a factor. They opt not to use sheep for leaf plucking due to the risk of sun scorch on the aromatic varietals. However, Bennett notes that other growers put their sheep in the vines at midday and while clusters are still green, which encourages them to leaf pluck on the shaded side.

The sheep are often co-grazed with chickens which provides some additional nitrogen. By using chicken tractors, the sheep also get a bit of added shade. Additionally, the chickens are fairly effective at overturning leaf litter and controlling overwintering pests.

When the sheep are not in the vineyards, they are grazed on rangeland in adjacent pastures. Typically, lambing is done on the range in January-February, after an aggressive cover grazing with both ewes and lambs. When necessary, lambs may be weaned early to move the sheep into the vines for suckering. Additional feed is supplied through the 25 acres of rye/clover/oat hay grown on the back acreage of the Pennyroyal site, and purchased alfalfa. With fluctuations in feed prices in recent years, growing a portion of their own feed has proven especially beneficial.

COVER CROP MANAGEMENT WITH SHEEP

At Navarro Vineyards, cover crops have been grown for many years, and Sarah notes that it was one of the first Fish Friendly Farming certified vineyards. Today, both Pennyroyal and Navarro plant several mixes (see below), opting for diversity rather than single species. A soil-building mix (fava, dundale peas, oats, vetch) is used

Cover Crop Mixes

Sara has used Wilbur Ellis and Le Ballisters cover crop mixes. Below are charts breaking down the type of seed and amount found in each mix.



Le Ballister's Plowdown Mix

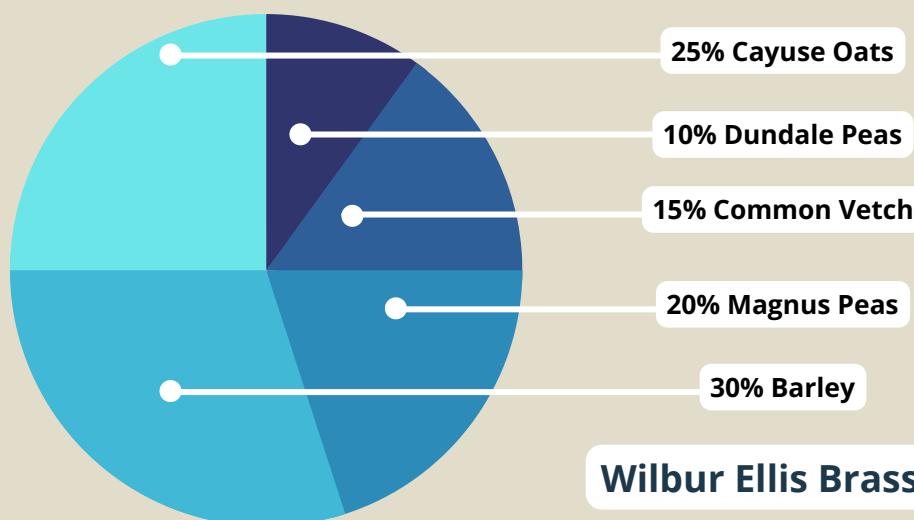
Persian Clover, Coriander, Baby's Breath, CA Poppy, CA Bluebell, Chinese Houses, White Yarrow, White Clover, Trefoil, Red Clover, Crimson Clover, Red Fescue, Fescue 'Eureka', 'Campa' Subclover, 'Losa' Subclover



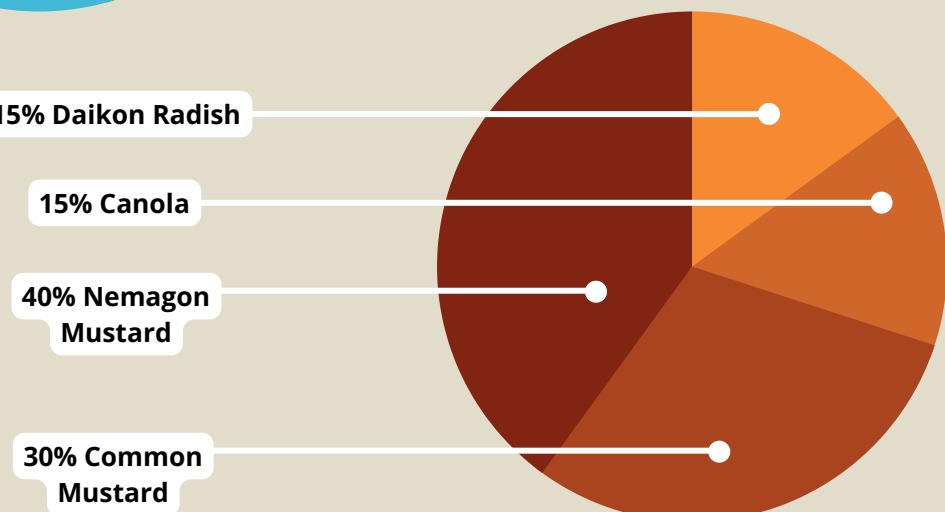
Wilbur Ellis Beneficial Habitat Blend

Bell Beans, Magnus peas, Dundale Peas, Common Vetch, Barley, Oats

Le Ballister's Pennywise Mix



Wilbur Ellis Brassica Hot Stuff Mix





predominantly, and in some blocks a brassica mix is seeded every few rows, which customers enjoy for the show of yellow mustard flowers in spring. The cover crops are planted in every other row, alternating each year which rows are cover cropped and tilled.

The alternate rows are occasionally reseeded with low-growing clovers and annual ryegrass, which is effective at reseeding; these rows are grazed with the cover cropped rows and mowed as time and season allows. Late blooming beneficial insect mixes are also seeded every four rows in the vineyards that aren't grazed that year.

By utilizing a variety of cover crops in the mix, the sheep graze more effectively than they would on a single-species cover. Bennett participated in aversion training (allowing sheep to consume the crop and administering nausea-inducing lithium chloride, creating an aversion to the specific crop) trials with the full-size sheep early on in her experiments with grazing vineyards. Today, she doesn't think it is necessary for the Babydolls to receive aversion training, provided there is enough diversity in the forage. Livestock naturally prefer a variety of plants in their diet, so given many options, the grape leaves become less of a delicacy. Additionally, the short stature and tendency for Babydolls not to stand on their back legs once they mature makes them well suited for vineyards.

POTENTIAL CHALLENGES & TRADEOFFS

COST OF BABYDOLL SHEEP:

This less common heritage breed is more expensive than many other breeds. In addition, their smaller carcass weight brings in about 20% less revenue when sold for meat. Taking into account cut and wrap fees, Babydolls are more costly per pound to process, although the small cuts are convenient for home processing. Sarah was able to purchase many of her sheep for a good price from someone leaving the business, and with additions of genetics from other farms, bred her flock to its current size.

ECONOMY OF SCALE:

A common challenge for folks getting into sheep farming is building up the flock. Many of the heritage breeds like the Babydoll Southdown have low populations, especially outside their native



regions. "When you're at a small scale, in some ways it can be just as hard to move twenty sheep as it is to move two-hundred sheep," Bennett notes. Putting in the time and energy while gaining less of the benefits from the animals can make it hard to justify keeping a small flock.

LOGISTICS OF ROTATING LIVESTOCK:

Moving the sheep should be done systematically, whether using herding dogs or electric or permanent fencing. Moving and managing electric fencing can be a time consuming effort. In hindsight, she would have replaced a row of vines with permanent fencing rather than only use electric fencing and vertical rebar barriers to divide vineyards into grazing blocks.

DROUGHT AND FEED COSTS:

Fluctuations in feed availability due to climate change and market instability have made feed costs an unpredictable challenge; however, this is common to most livestock operations.

PREDATION:

Predation from coyotes, mountain lions, and occasionally bears can be a major issue. Management practices used to avoid predation include investing in guardian dogs, electrifying perimeter fencing, using portable electric exclusively, night penning, and 24 hour human presence. However, some of these strategies only work in specific locations, are cost prohibitive, or may be logically impractical. The threat of predation is greatest during lambing season, which Sarah manages by putting the ewes and lambs in calf hutches for the first 24-72 hours. Still, many lambs can be lost during the few weeks prior to tail ear tagging and tail docking, and when ranging farther from their mothers to forage. Multiple guardian dogs are on duty at all times, and the flock is fed in the evening during lambing to encourage them to bed down together where it is easier for the dogs to patrol.

ADDRESSING FOOD SAFETY CONCERNS:

"Winemaking is incredibly safe," Sarah explains, due not only to the alcohol content, but also to the acidity of the wine which makes pathogenic growth less likely than in other crops. Still, she removes the sheep well before harvest to avoid any risk.

Other common concerns vineyard managers may have relate to compaction and the risk of irrigation damage. To avoid damage to irrigation lines, Pennyroyal has lines hung at 35 inches, and they haven't had any considerable issues. In terms of compaction, Bennett says that they haven't seen more compaction with the sheep compared to normal tractor use.

LOOKING AHEAD

The past couple of years have seen ups and downs, especially in regards to COVID-19. Pennyroyal shut down their tours to mitigate risks to customers and animals; the tours were an important part of the customer experience and helped to bring in business by distinguishing their tastings from so many of the other wineries. The 2020 August Complex Fire was also a threat in terms of winemaking, but both vineyards were able to salvage all of their grapes by bottling half of their reds as Rose and White Pinot instead of as red wines, which are more prone to carry smoke taint. There is a lot of uncertainty in farming, and Sarah underlines the importance of resilience and adaptability.

During much of the transition of Navarro Vineyards from conventional practices to its current management, Sarah was not as actively involved in the farm. Since joining forces with her family, the

operation has added significant diversity and a number of sustainable practices like the grazing program to both the business and land management. She notes that often the greatest transformation can be observed in taking a conventionally managed vineyard and applying soil health principles.

In speaking with other women in viticulture, she's seen that it is often difficult to convince landowners to invest in regenerative farming practices, including the higher costs and the new and unproven technology that can be involved. There is still much to discover. In the future, she hopes that through sharing her hands-on experience she can help other livestock managers and viticulturists navigate these challenges. In the meantime, she continues to do what she loves: tending sheep and growing wine grapes.



RESOURCES FOR GRAZING SHEEP IN VINEYARDS

Pennyroyal Farm

Pennyroyalfarm.com

CAFF's Integrated Crop and Livestock webpage

caff.org/ecologicalfarming/integrated-crop-livestock-systems

Targeted Grazing Contractors List from UC Cooperative Extension

ucanr.edu/sites/Livestock/files/320510.pdf

Targeted Grazing Directory from California Wool Growers Association

californiawoolgrowers.org/targeted-grazing/directory/

Fibershed's Producer Directory

<https://fibershed.org/producer-directory/>

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Reviewers: Sophia Bates, Pennyroyal Farm

Images by Joslyn Thoresen



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