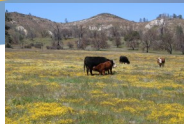


University of California
Agriculture and Natural Resources
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Livestock, Range, & Watershed

San Luis Obispo, Santa Barbara and Monterey Counties

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Weeds?**



Summer Growing Plants: Are they Poisonous, Good Forage, Or Just Plain Weeds?

Matthew Shapero, Royce Larsen

The dry season, on a normal year

Livestock producers generally know what they can expect out of their pastures heading into the summer grazing season. With annual-plant-dominated rangelands already dried, the nutritional quality of the forage has declined and no longer supports the full nutritional demands of livestock. A recent study we co-authored used data from ranches along the Central Coast to catalogue and quantify this process in detail.

Forage growing on rangelands goes through several stages starting with germination and early vegetative growth, then reaching maturity and producing seed, and finally drying out and weathering through the summer months, Figure 1. Results of this study showed how forage, a mixture of both forbs and grasses, shifts significantly in crude protein (CP) and fiber content as it progresses through these different stages, figure 2. However, the CP for forbs (e.g. filaree and bur clover) was higher and fiber content was lower than that of grasses, figure 3. Accordingly, the mixed forage samples showed that the CP level depended on the percentage of forbs versus grass.

Since the nutritional quality declines rapidly once the forage begins to dry out (Figure 2 & 3), ranchers may need to provide supplemental protein starting in late April or early May depending on the year. Livestock need at least 7% CP in their diet, and our study found that the forage was generally below that level as soon as it dried out.

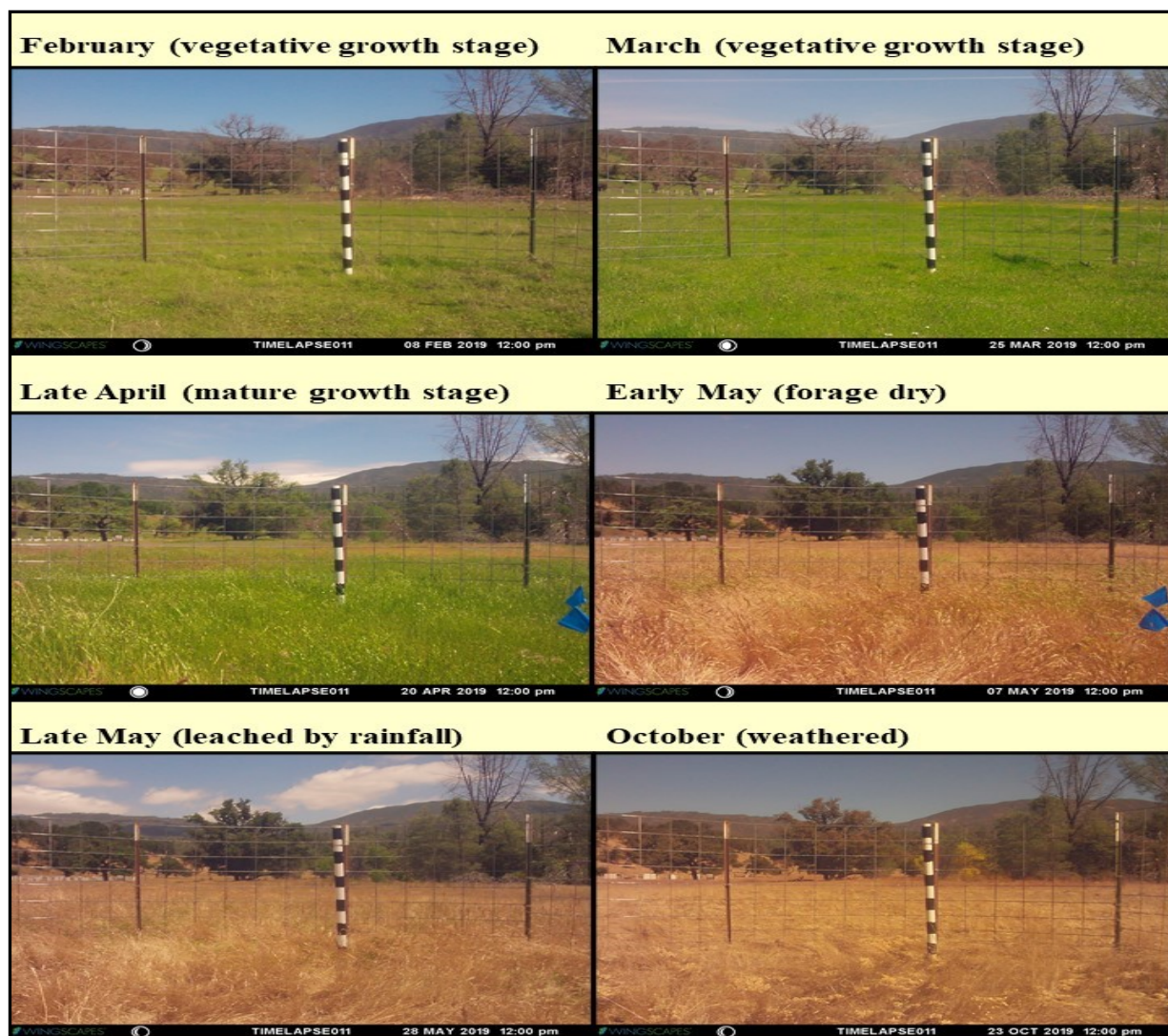


Figure 1. Various stages of the forage cycle: early (vegetative stage) to maturity and then drying out, and finally weathering over the hot dry summer months. During this year, there was a large rainfall event (1 ½ inch) during late May that leached out more nutrients after the forage was already dry. Then the forage undergoes intense weathering from sunlight degradation and wind abrasion through the summer months.

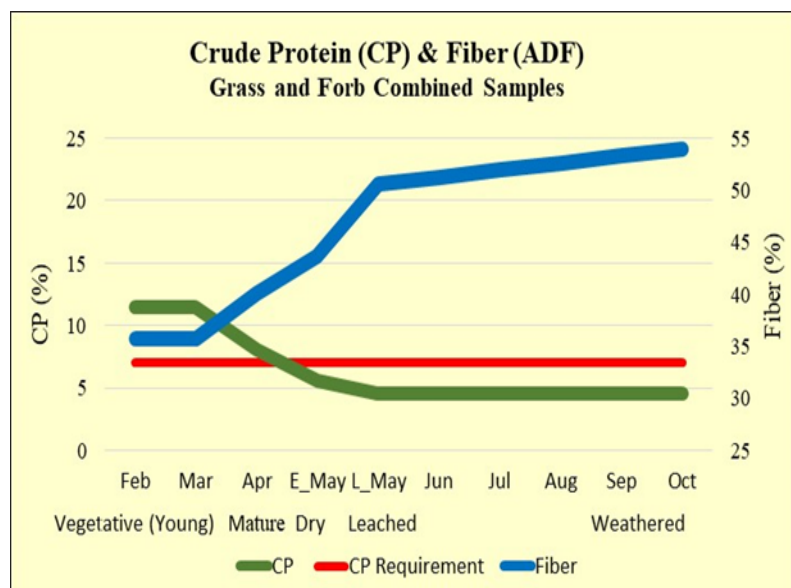


Figure 2. Crude protein (CP) and fiber (ADF) changes in forage (mixed grasses and forbs) during the different growth stages. Note, during this year the CP dropped below livestock needs (7%) by early May. ADF is low and CP is high in the early stages of plant growth, and changes once the forage dries.

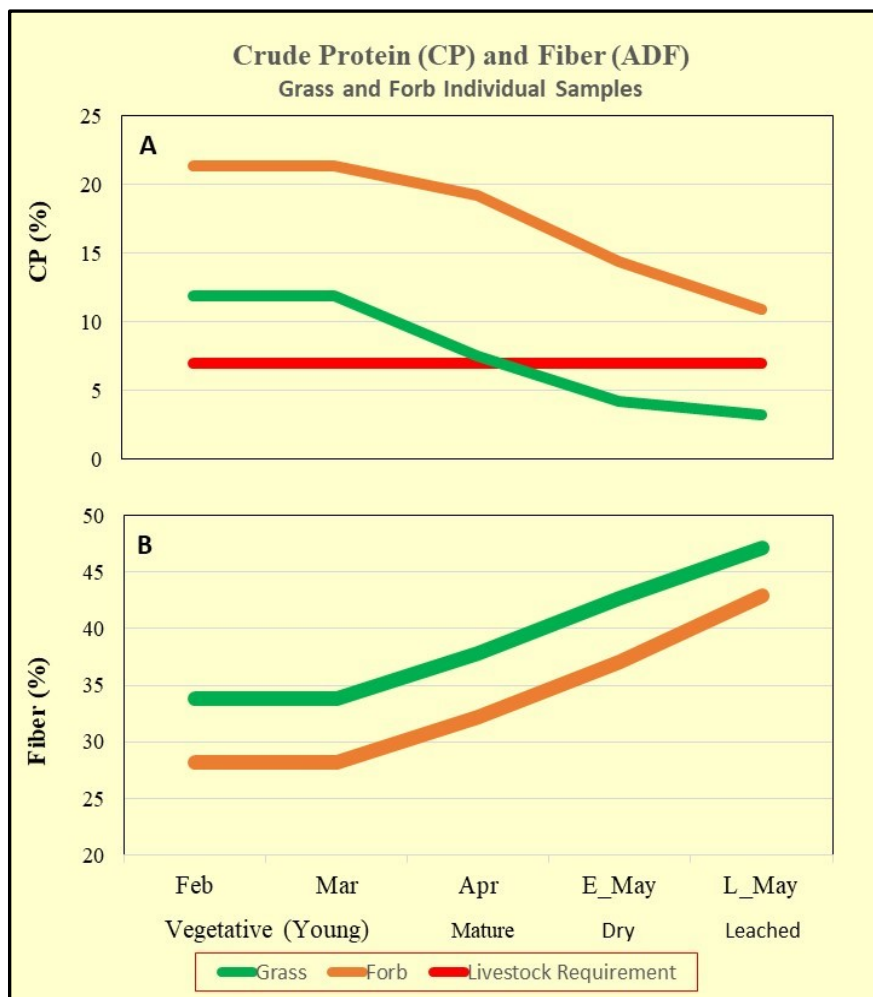


Figure 3. Crude protein (A) and fiber (B) of grasses and forbs separately shown from the vegetative growth stage, mature stage, and then dry and finally leached by rainfall. CP in forbs is higher than in the grasses. Fiber in forbs is lower than in the grasses.

cheeseweed (*Malva parviflora*), spikeweed (*Centromadia pungens*), morning glory (*Convolvulus* sp.), and yellow star thistle (*Centaurea solstitialis*) all had over 20 percent CP through April and maintained CP values greater than 15% into the summer, Figure 4.

Despite having high nutritional quality, a lot of these species aren't readily utilized by livestock, especially cattle. Increasingly, however, producers are having success "training" or familiarizing their cattle to begin consuming some of these late summer species. The beef manager at Cal Poly San Luis Obispo, for example, uses smaller pasture sizes to achieve a high-intensity/short-duration grazing impact. Among other benefits, he found that this procedure pushed his cattle to consume plants they didn't consume otherwise, including these late summer species high in CP; in fact as a result, he reported reducing the amount of protein supplement that his herd required (Aaron Lazanoff, 2020, personal communication). Alternatively, researchers like Kathy Voth (<https://onpasture.com>) have developed relatively simple training systems that encourage and teach cattle to learn to eat late summer growing plants.

But during droughts when there is little available feed, there is a potential to "force" livestock to graze on plants they wouldn't otherwise consume. There is an unexpected benefit here, in that they may be consuming plants that have high amounts of CP. But there is also a potential risk, some of the summer growing plants may be poisonous to them.

The dry season, during a drought

But now we are in another drought. There is less forage overall and what forage did grow likely matured earlier than normal, meaning that we will have a longer dry season, more opportunity for degradation, and even less nutritious forage throughout the year. It's on years like this one that a livestock producer might start thinking harder about the plants that do grow, especially the ones that remain green during the summer months. Are these nutritious for livestock? Or are they plants that livestock should avoid?

We found that many late summer-growing forb species were high in CP late into the summer dry period. Some of these plants, like summer mustard (*Herschfeldia* sp.),

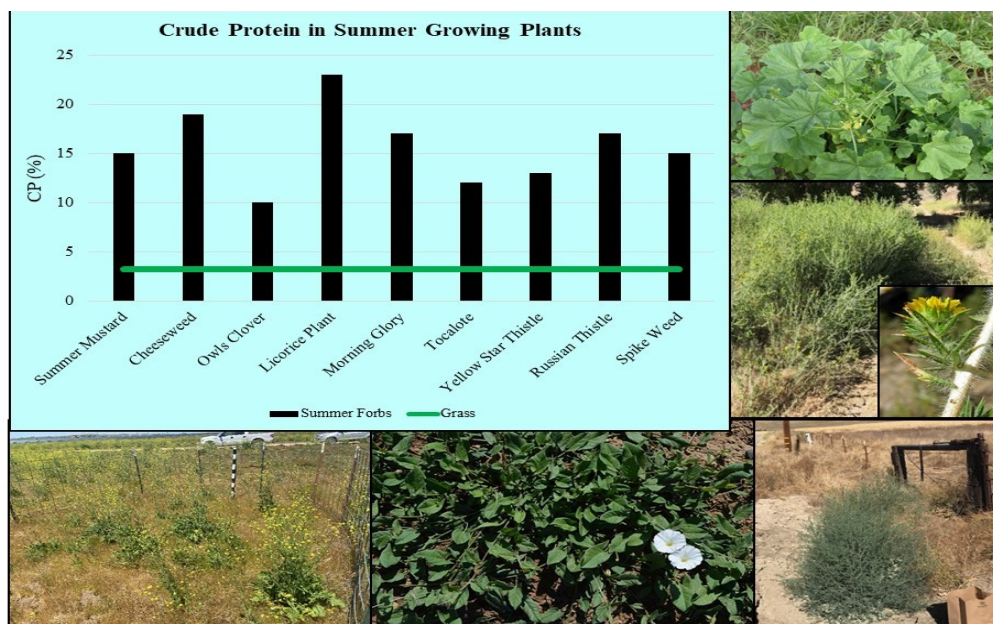


Figure 4. Crude protein values of summer growing forbs, shown with the CP value of dried grasses. These plants may be potential forage for livestock during summer months.

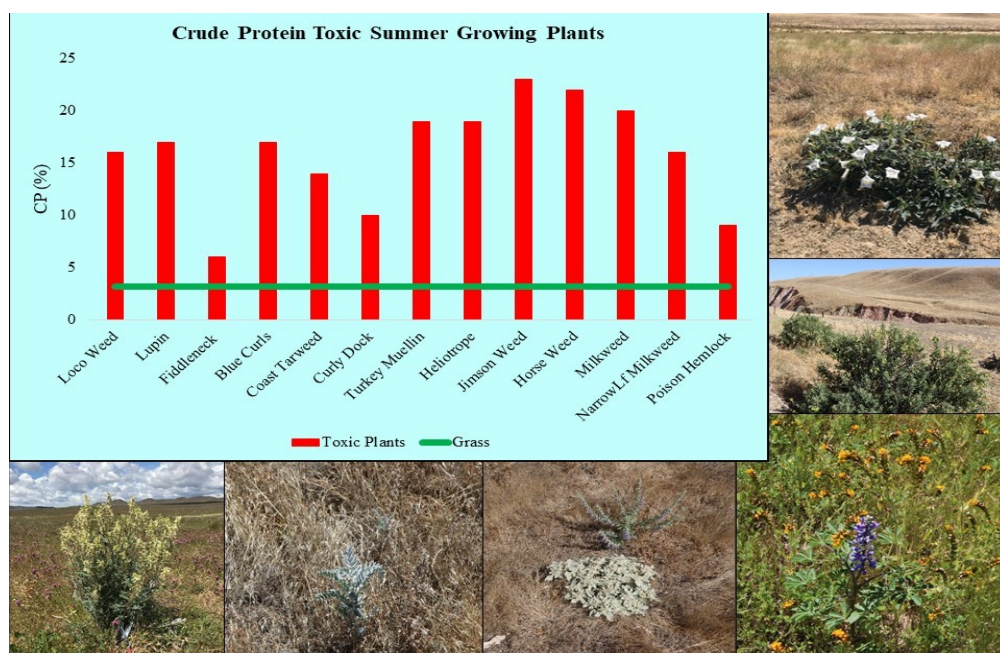


Figure 5. Crude protein for summer growing plants that are toxic, shown with the CP value of dried grasses. Careful management may be needed to prevent livestock from utilizing toxic plants during the summer.

Poisonous plants

Poisonous plants are always a concern on rangeland, even when there is not a drought. Normally, different species will differ in their relative palatability, often being influenced by the availability of other forage. For example, some plants like larkspur are very palatable and are readily grazed if available, while other plants like fiddleneck are very unpalatable and are only grazed under rare circumstances and/or when they contaminate other feed. Alternatively, plants like *Lupinus* sp. and *Astragalus* sp. are palatable, but consumption is limited if other more desirable forage is available.

During drought, these species may be more readily consumed based on the limited amount of other feed.

Interestingly, many poisonous plants also have high CP values, Figure 5. The amount of toxic Plant Secondary Compounds (alkaloids, condensed tannins, saponins) that causes poisoning varies by plant species and maturity. In addition, the effect these toxins have on livestock varies by individual animals and by livestock species. Some general guidelines can be found in the UC ANR publication Livestock Poisonous Plants of California (<http://anres.ucanr.edu/Publications/>).

In conclusion

It is always a challenge to balance the nutritional quality of available forage on California annual rangeland pastures with the nutritional demands of livestock, and drought makes that balance even more tenuous than normal. This year, producers will need to pay special attention to making sure their animals have access to sufficient amounts of CP, which likely means more supplementation than normal. Even if you have adequate *amounts* of feed, you will need to supplement with more CP to make up for the longer than usual dry season.

A drought year like this may also mean that your livestock are consuming plants they wouldn't normally otherwise. They may begin consuming summer growing species—like mustard or cheeseweed—which could actually be to their benefit, because these species would provide them with elevated levels of CP compared to more commonly consumed dried annual grasses and forbs. But livestock may also start eating poisonous plants, especially with a shortage of forage.

In general, a livestock producer should be aware of what forage is available to their stock and what their cattle are selecting and consuming. And during drought, this awareness needs to be even more elevated.

For those interested in exploring the full results from our paper, it can be accessed here:

<https://www.cnga.org/resources/Documents/Grasslands%20Journal/Grassland%20Issues/2021%20Grasslands%20Journal/CNGA%20Grasslands%20Winter%20V31%20No%201.pdf>

Larsen Royce E., Daniel Cook, Dale R. Gardner, Stephen T. Lee, Matthew Shapero, LynneDee Althouse, Michael Dennis, Larry C. Forero, Josh S. Davy, Devii R. Rao, Marc Horney, Katie Brown, Craig W. Rigby, Kevin B. Jensen 2021. Seasonal Changes in Forage Nutrient and Toxicity Levels on California Central Coast Rangelands-A Preliminary Study. Grasslands Journal – Winter 2021. 31(1):15-24.



A stand of fiddleneck (fire weed) on rangeland.



A cow grazing a late summer growing plant, that is still green.

Royce Larsen

A handwritten signature in cursive script that reads "Royce Larsen".

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Coronavirus Information

We are facing a crisis like most of us have never seen before. The state of California has issued an order to shelter-in-place. All UCCE employees have been directed to work remotely. However, we are still available by phone and email. UCANR, and the San Luis Obispo office, lead by Dr. Katherine Soule, has put together a lot information about the coro-