DROUGHT STRATEGIES: Weaning Calves Early

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Introduction

At their core, most ranch drought strategies involve increasing forage supply (by purchasing feed or leasing new grazing land) or decreasing forage demand (by reducing livestock numbers) to balance the stocking rate – carrying capacity equation. Selling cows immediately solves the quantity deficit, but can make cash flow difficult in the future because those animals will need to be replaced to avoid capital gains taxes. Weaning calves early can be an alternative strategy that reduces forage demand while maintaining the cowherd and genetic base. With early weaning, the assumption is that by giving up income this year, we save the forage base and cowherd for the future. Essentially, the practice assumes that the income reduction this year is less than replacement costs in the future, and less than the cost of purchasing hay or other forage. However, individual producers should evaluate early weaning before a decision is made–how much will this strategy cost you this year (i.e., how much income are you giving up by weaning early) and how much will it save you in the future (i.e., what would it cost to replace sold cows or buy feed if you don't wean early)? This publication will provide ranchers with tools for evaluating this decision.

While early weaning strategies have been studied in perennial rangeland systems, real world examples of early weaning in fall-calving operations on California's annual rangelands are not readily available. In California's Mediterranean climate, the timing of precipitation is nearly as important as the quantity of that precipitation, as demonstrated by long-term precipitation and forage production data at the UC Sierra Foothill Research and Extension Center (SFREC) in the California foothills (Fig 1). Through grant funding from the Western Sustainable Agriculture Research and Education program (WSARE), we evaluated early weaning from both a livestock performance and from a forage management perspective.

Early weaning involves evaluating competing risks. Future weather and forage growth are difficult to predict, and for fall calving herds, weaning early means pulling calves as they begin to enter the greatest period of growth in the entire season. Conversely, failing to reduce forage demand during spring drought conditions can affect the current year, and the next year, by using up residual feed that acts as both fall forage and mulch that can increase subsequent production. A real world example in annual rangelands is beneficial in determining how much weight gain is sacrificed by weaning early. This knowledge can be applied to determining whether the savings resulting from reducing forage consumption (and buying less hay) offset the loss of income resulting from selling lighter calves.

This publication provides an overview of research to help evaluate the potential costs and savings associated with early weaning for a fall calving cattle operation. Our results help producers work through management strategies to prepare for and respond to drought. As with all drought strategies, management tradeoffs are ranch-specific – depending on forage conditions, cattle genetics, marketing channels, and other factors. For a comprehensive framework for evaluating a full suite of drought management strategies, see our Drought Decision Support Tool for Ranchers.

Drought Defined

Rangeland drought decision making is more than simply a lack of precipitation. The seasonality of the drought is just as important in decision making. Critically, ***drought is the interaction of lack of precipitation and soil-moisture deficit potentially escalated by high temperatures and/or increased evapotranspiration*** (NOAA NCEI). On California's annual rangelands, seasonality of precipitation and climate-soil interactions result in different drought impacts depending on the season (Table 1).

Table 1: Seasonal Drought Drivers and Impacts

Fall Drought	Winter Drought	Spring Drought	Summer Drought
Drivers: Lack of fall precipitation. ***Impacts:*** delayed germination, fall/winter forge deficit (quality and quantity), lack of stock water.	***Drivers:*** Low temperatures (soil and air), short photoperiod, lack of precipitation (note: to some extent, this occurs most years). ***Impacts:*** Winter/early spring forage deficit (quality and quantity), lack of stock water.	***Drivers:*** Lack of precipitation, warm temperatures (soil and air). ***Impacts:*** Early emergence from dormancy, increased evapotranspiration (and decreased soil moisture), early forage maturity (and decrease in palatability/quality), lack of stock water, lack of fall dry forage.	***Drivers:*** Lack of winter snow pack. ***Impacts:*** Reduction in irrigation water, decreased mountain forage production, lack of stock water.

Specific management strategies are applicable to differing seasonal droughts. For example, providing supplemental protein to allow cattle to utilize dry forage may reduce the impacts of fall drought. With fall calving cows, early weaning may be an appropriate strategy during a spring season drought.

Evaluating Early Weaning

In February 2019, six experimental pastures were created at SFREC. In both the 2019 and 2020 grazing seasons, cattle were stratified by age and randomly assigned to the early weaning and traditional weaning treatment groups. There were 42 cows in each group (84 cows total). Pastures were sized so that stock density was equal across treatments. Cattle were turned into the experimental pastures after early weaning was completed in the third week of March.

Based on the advice of the project's Producer Advisory Committee, calves were weaned when the cows would traditionally have been pregnancy-checked (in mid-March). At the time early weaning calves were separated, weaning calf weights and cow body conditions scores (BCS) were collected on cows in both treatments. Following a one-week fenceline weaning process, the cows went back onto their experimental pastures (both traditional weaning pairs and early weaned cows).

In late May (2019) or early June (2020), the traditionally calves were weaned, again collecting weaning weights and cow BCS. The early weaned calves, which had been grazed on irrigated pasture since weaning, were also re-weighed in late May (2019) or early June (2020). In a real-world early weaning scenario, these calves would have been sold immediately after weaning; by re-weighing these calves, it was possible to experimentally assess performance differences between weaned calves and those that continued to nurse until the traditional weaning timeframe.

In late spring, forage samples were collected (grazed and ungrazed) from 180 plots (15 paired samples per pasture), measuring total forage production and grazing utilization. All cows were placed back on experimental pastures following weaning for the remainder of the summer. In early September, prior to the onset of calving, the cows were removed from the experimental pastures. Finally, in each year, BCS was collected on all cows prior to turning out bulls in late autumn.

Calf Performance

On average, early weaned calves were 188 to 225 pounds lighter than traditionally weaned calves weighed-in 74.5 days after the early weaning group (Table 2). We also compared the gains of those early weaned calves that were grazed on higher quality irrigated pasture at the time we assessed gains of the traditionally weaned calves, and found that they did not perform as well as the traditional weaning group on annual rangelands–at the traditional weaning date, the early weaned calves were still 85 to 123 pounds lighter. This finding differs from the results of Grimes et al. (1991), who found that early weaned calves performed better post-weaning than traditionally weaned calves. This discrepancy in results is due to the diet post-weaning; in most other studies, including Grimes et al., (1991), calves were fed a concentrate ration immediately after weaning. This is not common practice in California, which speaks to the necessity of this research. Although irrigated pasture is a high quality forage source, the early weaned calves lacked the presence of older animals that had experience grazing this type of forage; the presence of experienced animals is important for teaching foraging behaviors that can maximize gain (Shingu et al, 2017).

Table 2: Calf Weights (2019-2020)

	2019			2020		
Treatment/Class	n	3/19 Wt	5/30 Wt	n	3/20 Wt	6/5 Wt
Early Wean – Steers	21	403	529	26	372	474
Early Wean – Heifers	21	388	500	16	381	484
Trad Wean – Steers	23	-	623	23	-	597
Trad Wean – Heifers	19	-	596	19	-	569

Cow Body Condition Scores

One of the challenges in fall-calving systems on annual rangelands is maintaining cow body condition (BCS) at a level that allows the cow to begin cycling within 80-85 days of giving birth (BCS >4.5; Renquist et al., (2006)). In this study, individual body condition scores were collected on all cows pre-breeding (December), as well as at early weaning (March) and traditional weaning (late May or early June). As expected, early-weaned cows increased BCS after weaning. In 2020, early-weaned cows (who were not lactating) increased BCS by an average of 1.4 from March to June, while the lactating traditionally weaned cows increased BCS by 0.5 in similar forage conditions (Table 3).

Table 3: Cow BCS

	2019				2020			
Treatment/Class	n	Dec 2018	3/19/19	5/30/19	n	Dec 2019	3/20/20	6/5/20
Early Wean Cows	42	5.0	5.1	6.4	42	4.9	4.8	6.3
Trad Wean Cows	42	5.0	5.0	6.2	42	5.1	4.7	5.6

Forage Impacts

In annual rangeland systems, forage growth ends at peak standing crop, which at this study site typically occurs in late May or early June. Since forage growth does not resume until a germinating rain occurs (typically in October or November), the amount of forage remaining on or around June 1 represents the forage inventory available through the summer and fall months.

Precipitation and forage production were slightly above average at SFREC for 2018-2019. Even so, differences existed in forage removal at the end of the growing season (Table 4). Early-weaned pastures had more forage remaining in early June than traditional weaned pastures, suggesting that early weaning may conserve dry forage for use later in the season. In autumn 2019, SFREC did not receive a germinating rain until late November, meaning dry forage reserves became critical fall feed. This unexpected finding demonstrates that, in addition to conserving spring/summer feed, early weaning may have conserved forage for use in a fall with late germination.

Forage production in 2020 was contradictory, and may be the result of late season precipitation paired with unusually warm temperature conditions during the 2019-2020 water-year. Following a wet January 2020, February was one of the driest on record. Despite normal or near-normal precipitation in the March-May period, ungrazed forage appeared to experience accelerated maturity, as evidenced by the anomalous forage production data collected by SFREC at its' long-term forage production monitoring site (which measured 4420 lbs/ac on May 1, 2020, but a peak standing crop of 3087 lbs/ac in June).

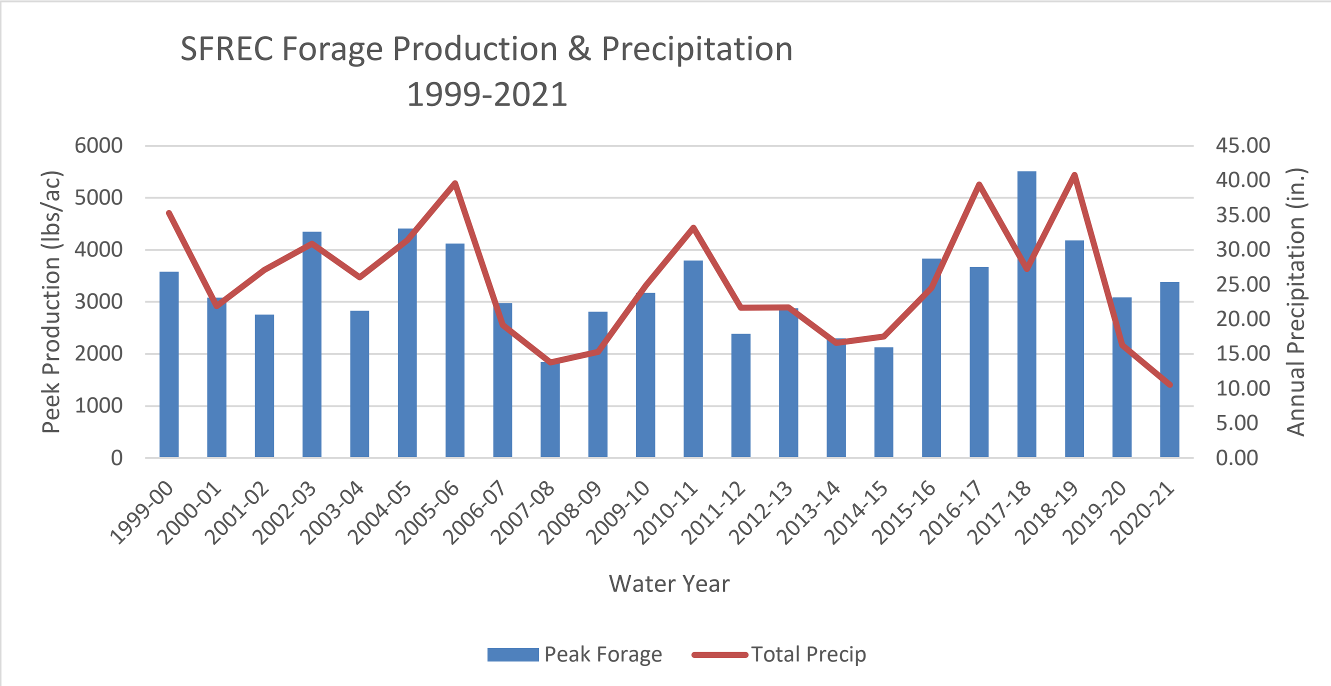
The data we collected was similar–the forage remaining in the early weaning pastures on June 1 (1455 lbs/ac) was virtually identical to the forage remaining in the traditional weaning pastures at the same time (1461 lbs/ac). We suspect that grazing may have slowed the opportunity for accelerated forage maturity. As a result, grazed forage may have been able to respond with continued growth from existing soil moisture in April and May, while ungrazed forage may have matured to the extent that it could not continue growing in May (Table 4). Other research has shown that unless there is a significant lack of soil moisture, annual grasses will continue to mature despite grazing pressure. In the case of Davy et al., (2014), forage regrowth was possible even when areas were grazed with high stock densities (during spring) given adequate soil moisture. The moderate stocking density of this trial, as would be seen in a traditional operation, would likely facilitate regrowth in the moderately dry conditions of 2019 and 2020.

Table 4: Forage production (2019-2020)

	Year	Total Production	% Harvested	Forage Remaining (Jun 1)
Early Weaning	2019	2373 lbs/ac	38%	1470 lbs/ac
	2020	2724 lbs/ac	47%	1455 lbs/ac
Traditional Weaning	2019	2224 lbs/ac	51%	1101 lbs/ac
	2020	2510 lbs/ac	42%	1461 lbs/ac

The results of the forage production data suggest that predicting spring forage growth on annual rangeland requires assessing soil moisture throughout the growing season, regardless of precipitation quantity. This is because soil moisture is controlled by additional climatological factors including temperature, wind, etc. Long-range forage production data from SFREC bears this out: SFREC has measured higher-than-average forage production in drier-than-average years and vice versa (Figure 1).

Figure 1: SFREC forage production and precipitation (1999-2021)



Management Implications

Early weaned calves in this California annual rangeland trial were significantly lighter than the traditional weaned calves in both 2019 and 2020. Once weaned, calves in the early weaning treatment group did not gain as rapidly as non-weaned calves. Although forage production was not limited for either treatment group (in other words, we did not experience true drought conditions during the study), the results likely showcase the largest possible weight difference between treatment group. SFREC is considered an excellent annual rangeland ranch with a green-feed season lasting longer than many others in California, and production was ample for continued weight gain regardless of treatment. Had forage production faltered considerably, the traditionally weaned calves would likely not have gained as well as seen in these two years.

Early weaned cows recovered body condition score more rapidly than the traditional weaned cows on similar forages. Though this trial did not produce a lack of forage that caused a reduction in body condition to the point of a loss of fertility, it certainly could happen in years of low spring forage production. The differences in replenishment of body condition are still worth noting, especially if cows are falling to trigger levels of a BCS of 4.5 or less, which would impact reproduction.

If considering early weaning, several factors can help making a decision in light of this inevitable uncertainty. First, assess soil moisture even if it requires digging into the soil profile manually. Other climatological factors can also influence soil moisture so really knowing is crucial. If there is soil moisture in the root zone, do not early wean at that time. Second, check the forecast using tools such as climate prediction center (NOAA; https://www.cpc.ncep.noaa.gov/). Although a forecast may be an educated guess when looking more than a week into the future, it's the best resource we have. If soil moisture is depleted and the forecast looks dry, it certainly suggests that fall-calving operations should strongly consider early weaning. Third, talk to a marketing representative and check local sale barn prices. Early spring prices for calves are often higher than late spring/early summer. Marketing California calves in the spring is advantageous because calves can be shipped across the US, where unlike California, a summer growing season is normal. Besides the higher price for lighter cattle, they may be worth more due to the timing of marketing. Checking with a marketing representative can help in decision making, and marketing the cattle when potential buyers in the local area are also facing drought.

Considering the Economics

The chart below is an example based on the data collected in these trials and current sale barn prices of cattle–it can be used as a template to support your decision-making process. The example assumes that hay must be fed for two months to replace forage lost to drought conditions. Updating the numbers with current hay and cattle market numbers is strongly suggested. In addition, the calves in these studies were weaned approximately 60 days early. On average, the traditionally weaned calves gained 3.4 lbs/day between the early-weaning date and their traditional weaning date–it is important to adjust these values if weaning times are less than the 60 days reported in the worksheet. Finally, early weaning may make the most sense when producers are concerned about the amount of standing forage available during the following autumn. Even in cases where a ranch is stocked conservatively, poor springtime growing conditions can impact fall forage availability.

Sample calculations for early (60 days) vs traditional weaning of a ranch producing 73 calves with spring calving cows ($75)

Questions	***Normal wean (late May)***	***Early wean year (Late March)***
How many calves do you plan to market this year?		
Steers	44	44
Heifers	29	29
What are your typical weaning weights?		
Steers	600	405
Heifers	575	395
What do you anticipate prices will be (per lb) for these weights at your typical sale date?		
Steers	$1.50	$1.85
Heifers	$1.35	$1.55
Income per head		
Steers	$900.00	$749.25
Heifers	$776.25	$612.25
total income (including steers and heifers)	$62,111.25	$50,722.25
Reduction in income due to early weaning	$11,389.00	
Factoring in hay savings by weaning early		
How much hay would you need to feed if you had to feed half the diet (500 lbs/mo) for two months in the fall?	75 cows (38 ton)	
What do you expect to pay for hay (per ton) delivered?	$350	
Total cost of hay to avoid early weaning	$13,300	
Total theoretical savings from early weaning	$1,911.00	

Pulling the Trigger

To be most effective, write down your drought plan. Include the proactive steps you've taken (like stocking your ranch conservatively, or keeping track of cattle you would sell during drought), as well as the reactive strategies you'll use (like feeding supplemental protein during a dry fall or early weaning). Be sure to include critical dates for implementing each step–critical dates will help keep you accountable to your plan and remove some of the emotion from these difficult decisions. Analyzing the economic and financial impacts of potential strategies will also help make your drought plan more objective. Keep in mind that drought conditions can span the seasons outlined below – a dry fall can extend into a dry winter, requiring additional strategies.

Fall Drought	Winter Drought	Spring Drought	Summer Drought
Impacts: • **Delayed germination and growth** • **Lack of fall/winter forage** • **Lack of stock water**	***Impacts:*** • Lack of winter/early spring forage • Lack of stock water	***Impacts:*** • Early emergency emergence from dormancy • Increased evapotranspiration and decreased soil moisture • Early forage maturity and decrease in forage quality • Occasional lack of stock water • Lack of fall dry forage	***Impacts:*** • Reduction in summer irrigation water • Decreased mountain forage production • Lack of stock water
Fall Calving Strategies: **Focus on using conserved dry forage:** • **Supplement protein to utilize dry forage** • **Develop or haul stock water** • **Sell old and problem cows**	***Fall Calving Strategies:*** Focus on using a conservative stocking rate: • Set stocking rate to survive December and January • Develop or haul stock water • Sell old and problem cows	***Fall Calving Strategies:*** Focus on conserving spring forage for fall grazing • Move to irrigated pasture early (if possible) • Sell open cows • Wean calves early	***Fall Calving Strategies:*** Focus on conserving forage for fall grazing and optimizing pasture production • Sell old cows (as bred cows) • Consider options for changing irrigation (short season, fallowing part of pasture, etc.) • Consider options for shortened mountain grazing season
Possible Critical Dates **Oct 1 – Dec 1**	***Possible Critical Dates*** Dec 1 – Feb 1	***Possible Critical Dates*** Mar 1 – Apr 1	***Possible Critical Dates*** May 1 – Jul 1

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