

Slide 1



## Effects of Drought on Arizona Cow-Calf Operations

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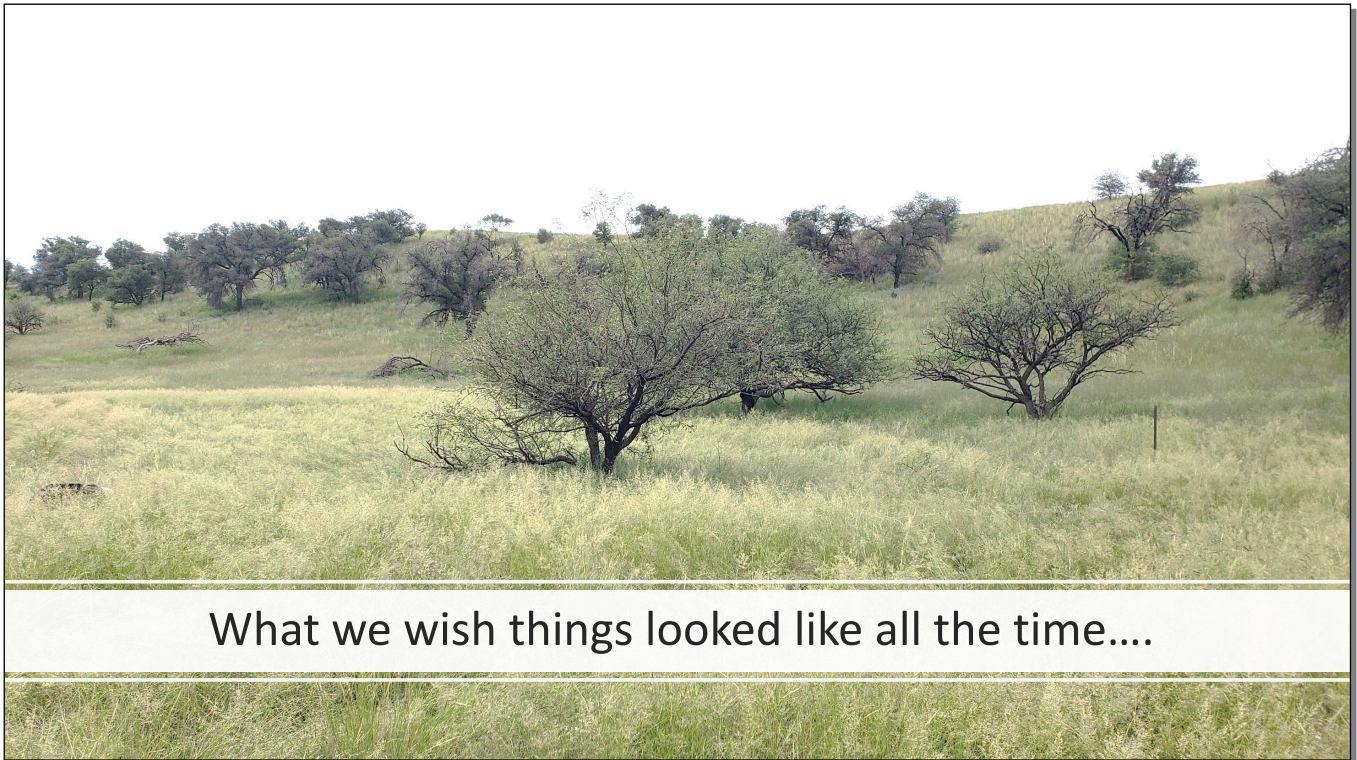


THE UNIVERSITY OF ARIZONA  
**Cooperative Extension**

Briefly introduce myself (speaker).

Today we're going to spend some time talking about the effects of drought on cow-calf operations in Arizona.

Slide 2



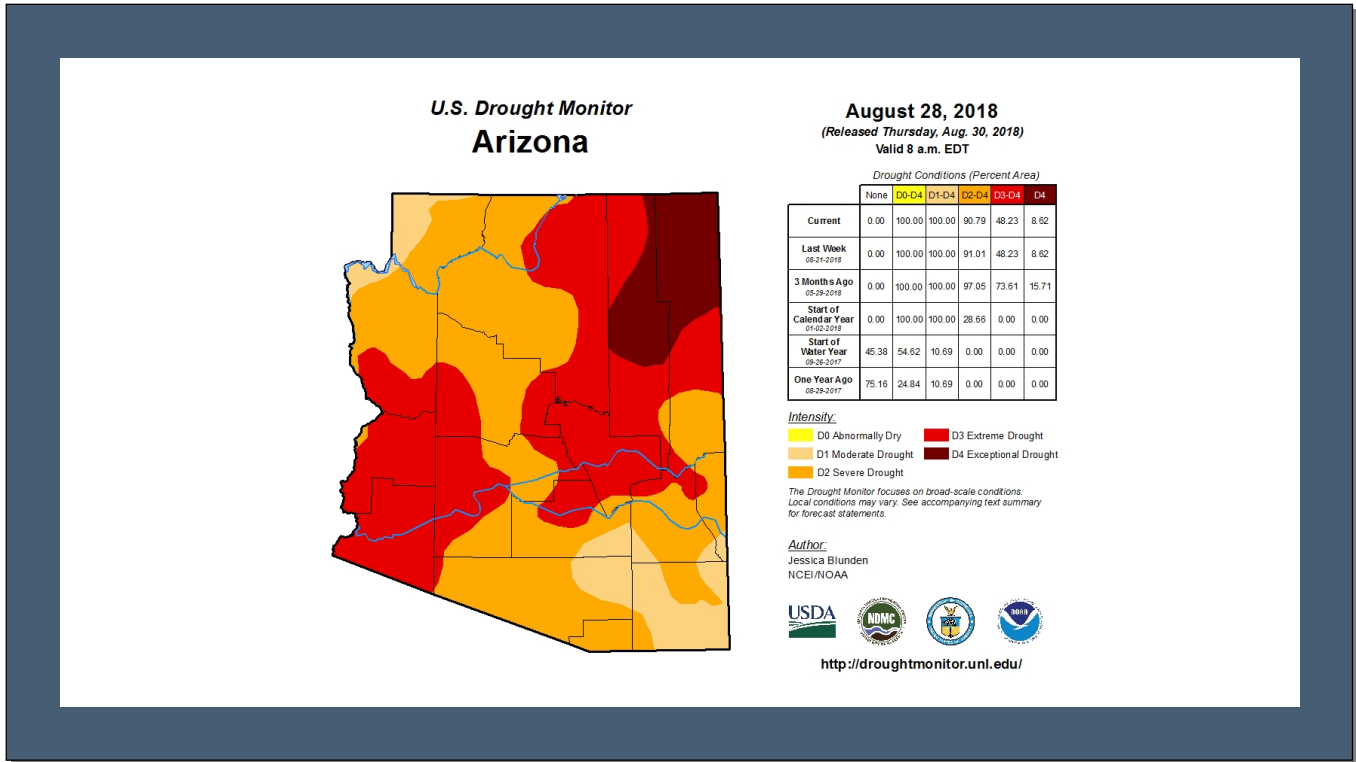
What we wish things looked like all the time....

In Arizona we spend a lot of time talking about rain. We're either talking about how much rain we are getting, or how much rain we aren't getting. It would be fantastic if things looked like this all the time. This picture was taken near Sonoita, AZ in August of 2017. Clearly, we were having a great monsoon season.

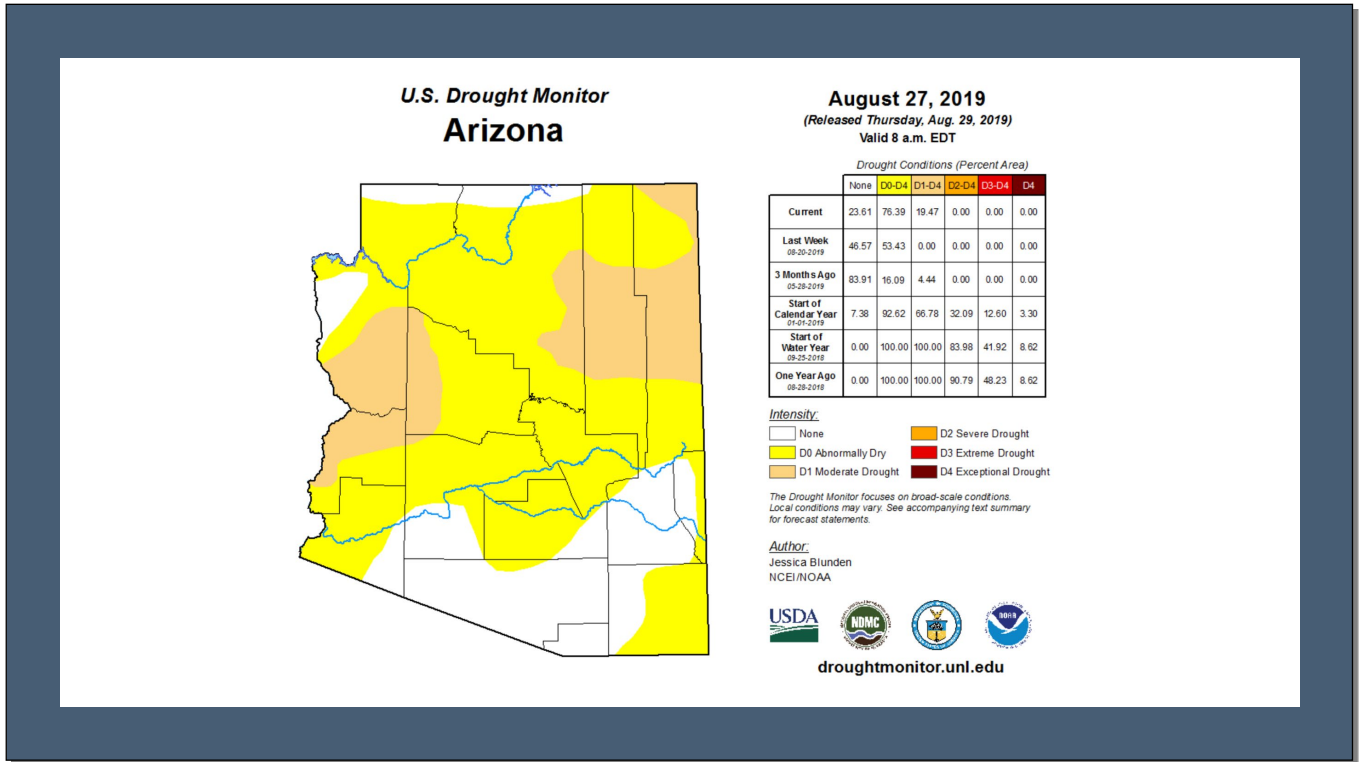
Slide 3



However, this view is more common. Drought is a reality in Arizona and something producers should always have in the back of their mind as a possibility.



Just one year after that first picture, here is the US Drought Monitor from August of 2018. You can see that at this point, despite being 2 months into monsoon season, all of the state is in at least a D1 drought and 90% is in D2. Just one year prior to this, only 11% of the state was experiencing D1 drought and no areas were in D2-D4. As a side note, if you haven't signed up to receive the U.S. Drought Monitor for Arizona, you can do so at the website listed here in the slide.



One year later, you can see that conditions have improved, but much of the state is still abnormally dry.



## Because drought is a reality in Arizona producers should:

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- Understand the potential short- and long-term effects of drought on their cattle
- Be aware of special health and nutritional challenges presented both during drought
- Have a drought management plan in place for the ranch

As you can see, our drought situation can change drastically from one year to the next. Its vital that you as a producer understand things like the short- and long-term effects of drought on your cattle, as well as on your rangelands. Know that drought can have a significant impact on the health, nutritional status, and reproductive capacity of your cattle. Even at the conclusion of drought, you should be aware that you are not out of the woods just because its raining. The best thing you can do is have a drought management plan in place before you actually need it.



# SHORT TERM EFFECTS ON CATTLE

Lets talk about the short term effects of drought on your cattle.



## Primary Problems Are Related to Malnutrition

- Insufficient energy and protein in forage
- Increased energy output cattle walking further to graze
- Mobilization of body energy reserves = loss of body condition

Primarily, the problems we see related to drought are due to a lack of groceries (feed). During drought, not only do we see decreased availability of forage on the landscape, the forage we do see is generally of poor quality. It will be deficient in both energy and protein and likely will not be able to meet cattle needs. There is a significant correlation between forage quality and cattle forage intake. As forage quality decreases, digestibility of that forage also decreases. This means that a cow grazing that forage is simply able to consume less forage overall as a percentage of her body weight. It's a double hit: not only is the forage of poor nutritional quality, she also can't eat as much of it.

We also see cattle will increase their energy output. They will need to walk further to find forage, which expends more calories. They may also need to walk further to find water as some sources dry up. The net effect of both of these, the decreased forage quality and intake and the increased energy expenditures, leads to the situation we are familiar with during drought: cattle lose weight and condition due to being in a negative energy balance.





## Effects on Reproduction

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- Reproductive Effects
  - Dystocia and retained placenta
  - Longer time to cycle
  - Early embryo death
  - Decreased service capacity in bulls
- Immune Effects
  - Increased weak/dead calves
  - Increased abortions from infectious agents
  - More post weaning health problems (BRDC)

<https://extension.arizona.edu/pubs/easy-use-system-determining-range-cattle-body-condition>

We know a lot of things about cattle in a negative energy balance. Cattle that are losing weight or at a low body weight have difficulty conceiving or (in extreme cases) maintaining a pregnancy. Everyone is familiar with body condition scoring right? If you're not, check out the link on this slide and you can learn how. Basically, cattle are assessed on a 1 to 9 scale, with 1 being an extremely emaciated animal and 9 being an extremely obese animal. An animal that scores a 5 would be in ideal condition, not too fat and not too skinny.

Research has shown that cows who calve at a body condition score of 4 have a pregnancy rate 20-30% lower than cows who calve at a 5 or above. Cows who calve at a body condition score of 3 or lower see a reduction of additional 20-30% in pregnancy rate compared to cows who calve at a 5 or above. This is due to several factors. Cows that calve in a body condition score of 4 or lower are more likely to experience dystocia – difficulty during calving - (especially heifers) and are more likely to retain their placenta. Both of these lead to increased time between calving and when those animals begin to cycle and are ready to rebreed. Even cows who do not experience dystocia or retained placenta will have a significantly increased calving interval if they are low body condition score or in a severe negative energy balance.

Bulls who are experiencing negative energy balance will have a decreased service capacity. Not only must they expend more energy searching for feed and water just as the cows do, they must expend more energy reaching the cows themselves. Body condition score has an impact on scrotal circumference – which is directly correlated with fertility. Its not common for bulls to lose 1-200 pounds during the course of a normal breeding season.

There is one further consideration on the reproduction side of the equation: the immune effects of poor nutrition on the calf crop. We are more likely to see weak or dead calves born to mothers with low BC scores. Those low body condition score cows also produce less colostrum and it tends to be lower quality colostrum. This means that calves born to those mothers have less passive immunity to disease, and when they are vaccinated their immune systems don't respond as well or sometimes at all. The net result is calves that are lighter at weaning and tend to have more issues with post weaning health problems, for example bovine respiratory disease complex.



# **LONG TERM EFFECTS OF DROUGHT**

Drought has some long-term effects as well. Some of these effects show up fairly soon while in a drought but can also persist for several years even if conditions improve.



## Long Term Effects on Cattle and Rangelands

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### Cattle

- Loss of key herd genetics
- Decreased productivity – fewer and lighter calves
- Slow process to rebuild after drought

### Rangelands

- Loss or reduction in key forage species
- Loss of productivity (stocking rate)
- Erosion impacts

Talking about the cattle side of things, loss of key herd genetics is one of the biggest impacts to a ranch. Without intervention the most productive cows, the ones that are on the rangelands doing their job and raising a calf each year, are going to struggle the most as they require more resources. Being diligent about culling nonproductive, non prime age animals first and supporting the core base of the herd can help mitigate this. However, if the drought is severe or long lasting enough its likely that some genetically desirable animals will need to be culled.

As drought situations continue on, especially into multiple years, decreased productivity in the form of fewer and lighter calves becomes a real financial concern for the ranch. Likely there is some additional outlay in expenses – feed, water, supplements, and labor – and now a decreased income to go along with that. Being aware and having a financial risk management plan in place (savings and/or insurance products) can help to keep the ranch finances stable.

Rebuilding the herd after a drought is a slow process as well. Its likely your herd age is trending higher as you may not have kept as many replacement females during the drought period. This means holding back a few extra replacement heifers in the years following drought to bring your overall numbers back up and cull out some of the aging animals you may have been holding on to. That means fewer calves to sell for a few years, or an outlay purchase of replacement heifers.

On the rangeland side, loss or reduction of key forage species is of great concern. During drought plants will struggle, especially if they are overgrazed. The most palatable species will be the most significantly impacted, and these are usually the most desirable as forage species. Their loss can allow for the infiltration or expansion of less desirable and/or invasive species. Along with this we will see a loss of rangeland productivity and a decreased stocking rate following a drought. Grasses and other plants require several years of normal conditions to return to full productivity following a drought event. Finally, loss of grasses creates opportunities for erosion to impact the landscape when the rains do return. Grasses are key to soil retention, and large amounts of bare ground are subject to erosion. Once erosion has started, its difficult to stop it from progressing without intervention.



## **SECONDARY PROBLEMS ARISING FROM DROUGHT**

There are some secondary problems we see related to drought that are sometimes not considered.



## Water and Salt

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- Water quantity and quality
  - Bogging down
  - Dissolved compound concentration
  - Bacterial or toxic algae
- Salt Toxicity

Everyone is probably very familiar with having water quantity issues during drought. Dirt tanks or wells can dry up and I'm sure many of you have had the experience of having to haul water and understand the challenges associated with that. That's a very primary problem arising from drought, but there are some secondary effects resulting from lack of water or lack of good quality water that sometimes get overlooked.

Dirt tanks that are drying up can cause a few issues on the ranch. First, cows and calves can bog down and become stuck in deep mud as they wade further in to reach the water line. Several Arizona ranches have been systematically switching to drinker tanks and fencing off their dirt tanks for this reason (as well as the increased reliability of drinker water).

Additionally, as these tanks dry up water evaporates but the dissolved solids – things like salt, sulfates, nitrogen/nitrates just to name a few – become more concentrated in the water that is left. The water leaves the system, but these compounds do not. As cattle consume this water, they could be more susceptible to nitrate toxicity, salt toxicity, or polio. Finally, as the water level gets very low the water temperature can increase and make the tanks become more susceptible to toxic algae blooms and bacterial contamination.

Salt toxicity arises when cattle consume salt and are unable to consume enough water to balance their system. This could be because the salinity of their water supply is too high (as in the dirt tank situation we just talked about), or if cattle are restricted from fresh water intake for more than 24 hours. This happens faster if cattle are heavily consuming a salt or mineral supplement and suddenly find their normal water source dried up. If you know your water sources are at risk of drying up, consider pulling your salt or mineral supplement until water sources are stabilized.

Just as an aside, how much water does a cow consume per day? 10-16 gallons, depending on production status. Calves 4-10 depending on age.





## Toxic Plants

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- Cattle will eat things they normally avoid
  - Snakeweed, Burroweed
- Things that are not normally toxic can become toxic
  - Johnsongrass (HCN)

It's no surprise that toxic plant poisonings go up during periods of drought. There are two reasons for this. First, when forage becomes scarce cattle will start consuming anything that looks palatable. Quite often we see burroweed poisoning due to its prevalence on Arizona rangelands. Take a look at this picture. Does anyone know what plant this is? It's snakeweed. As you probably know, snakeweed is normally very unpalatable, and cattle don't usually consume it. But this plant has clearly been heavily grazed. This was a small producer that had a significant drought issue. They had very little rain during their monsoon season and had been supplementing their cattle with hay. They got a little rain a week or so before this picture was taken, and they thought it was ok to stop feeding hay. Unfortunately the first and only plant that responded to the rain and greened up was the snakeweed. They lost about 1/3 of their small herd over just a few days.

The second reason toxicity issues increase during drought is that some plants that are normally not toxic can become toxic. Johnsongrass is one good example of that. During times of stress (such as drought) this plant can produce toxic HCN, or Hydrocyanic Acid.

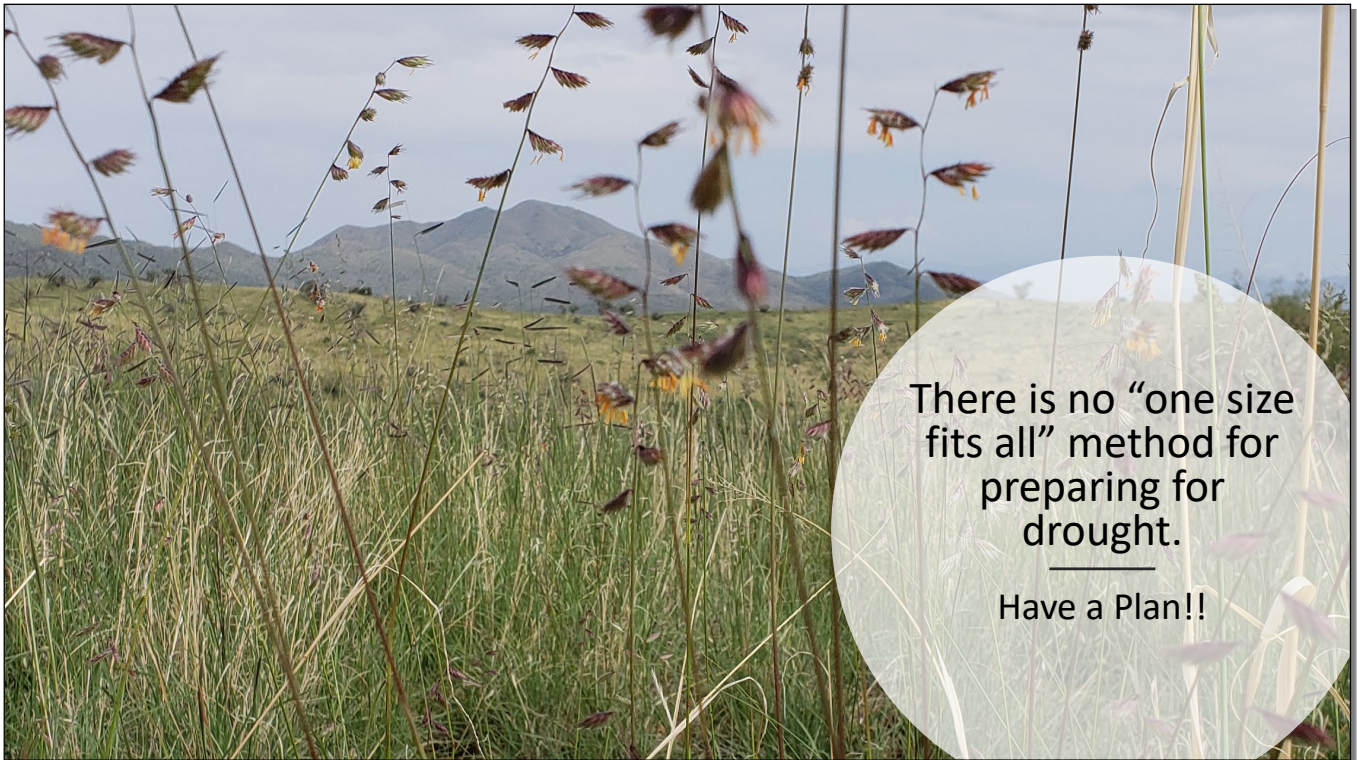
The only way to combat plant toxicity during times of drought is to not allow cattle to graze in heavily depleted pastures. If you are supplementing feed don't suddenly stop until you know

there is good quality forage available to the animals. Be especially watchful when you do begin to receive rainfall again, sometimes the first plants to “green up” are toxic!



## **DROUGHT MANAGEMENT PLAN**

So what do we need to be thinking about as we prepare our operations for drought?



First, there is no one size fits all method for preparing for drought. Your plan needs to be tailored to your ranch. Your pasture layout, forages, water sources, and management practices are all unique. However, there are a few goals that every operation will have in common: to maintain productive cattle, to preserve rangelands for future grazing, and to reduce financial risk to the operation.



## Records and Information to keep:

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- **Forage production inventory** is vital to determine stocking rate
- Accurate **herd inventory and production records**
- Yearly **rainfall records**
  - [MyRAINgelog.org](http://MyRAINgelog.org)

Keeping ranch records during all years can really help to aid in the decision making when faced with a drought situation. Put these record systems in place now, in whatever form works for your operation, so you have the vital information when making your ranch plan or making decisions during drought.

You should work with your state or public land agencies, NRCS, and/or Cooperative Extension to develop a forage production inventory and determine the stocking rate of your operation. This should be done often: ideally at the end of your grazing year or growing season. This process is especially important if your ranch is subject to a major event like an over-extended grazing event, a fire, or other major ecological change.

Maintaining accurate herd inventories and production records for individual animals is another important piece of information when making drought decisions. Culling animals down to a smaller number is one way producers can help their operations weather drought. Having good records for individual animal performance helps when making decisions: less productive or genetically inferior animals can be culled first. This preserves the most productive animals with the highest genetic potential.

Keeping track of historical rainfall at the pasture level is another way to help track the relative severity of a drought on your operation. In many cases, the nearest official weather station to your ranch could be some distance away and data is extrapolated to provide an overview of the landscape. MyRaingeLog.org is a free online tool that can help you keep track of this data and compare rainfall year to year at the ranch or pasture level. On that site you will also find instructions for building and installing rugged rain gauges designed to collect rain data on even the most remote areas of your ranch.



## Ranch Planning for Drought

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- Examine your current grazing setup & limiting factors
- See where you can pro-actively improve to mitigate drought
- Work with your state/federal agency, NRCS, and Cooperative Extension office

Resources:

<https://cals.arizona.edu/droughtandgrazing/guides>

Once you have your record system in place, examine your current grazing setup. Print out a map of your ranch and mark down your current pasture rotation. Look at the location of waters and note which ones are most likely to dry up in a drought situation. Often this is a limiting factor in a drought situation. From there you can determine your contingency options. These could include moving cattle to pastures that tend to get more rain or that have more reliable water sources, moving cattle to a location where you could more easily haul water or provide supplemental feed, or even developing new water sources to better supply some areas of the ranch. You may need to work with your grazing agency to alter your ranch plan or grazing plan and develop those new water supplies.

The link under the resources heading includes several guides to this process, including how to include your state or public land agency. These resources were developed by Extension professionals at the University of Arizona Cooperative Extension and the School of Natural Resources and the Environment.



## Cow Herd Planning for Drought

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- Cull in a timely fashion. Total reduction may be less if culling starts early
- Cull high risk cows first, but don't hold them to low BCS (1-3) due to price discount
- Develop systematic culling system

Another aspect of your drought plan should include your herd plan. It's inevitable that cows must be culled in a drought situation. Making that decision in a timely fashion, early in a drought, is preferable to waiting. Culling cattle early means they will likely be in better condition for sale (more money in your pocket) and can help to preserve rangeland conditions. In fact the total herd reduction needed may be less if those culling decisions are made earlier.

High risk and low performing cattle should be culled first: old, unhealthy, or under performing animals. Don't hold onto these cows until their body condition score is low, culling them while they're still in good condition means a better return for those cull animals. Develop a systematic culling system that is used each year on the ranch.





## Possible systematic culling plan:

1. Dry open cows
2. Open cows with calves over 4 months
3. Cows with defects: Bad feet, bad udders, bad eyes, or broken mouth
4. Young replacements
5. Older cows with calves at side
6. Thin quality cows with offspring at side
7. Last to cull good condition mid aged cows bred and/or with calves (5-10 years old)

Here's an example of a possible systematic culling plan. In any year, you would cull animals that fit these categories starting with group 1 until you have culled the appropriate number of animals. In normal years, that may be cows from groups 1 through 3, but in drought years you will likely get further down the list. The key thing is that these decisions are made before you are in the tough and emotional situation of making a heavy culling decision. A systematic plan like this helps to preserve the highest producing cattle in the herd as long as possible.

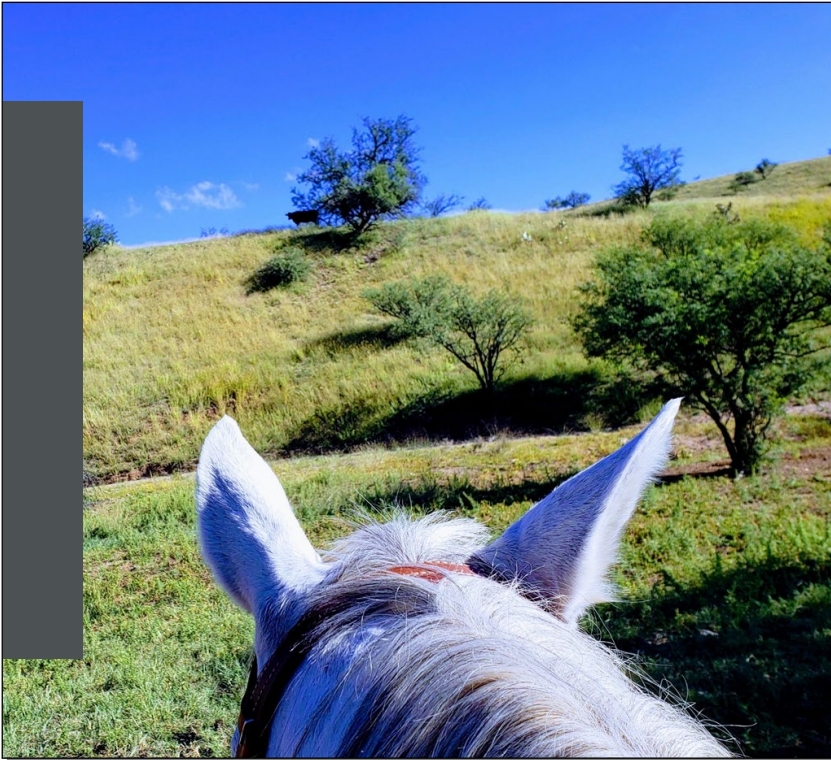
The first cows to cull would be dry cows without calves – these cows did not produce a calf last year and are not bred currently. Be wary, both this group and the next group likely contain some of the best looking animals in your herd. They may be in good body condition, but that's probably because they aren't "working" (producing a calf) and have extra resources because of that.

The next group would be cows (especially older cows) with defects. Things like bad feet, bad udders, bad eyes or a broken mouth. This is a good time to get these animals out of your herd, even if they're producing. They may begin to struggle when resources become scarce and it's better to get them out of the herd now while they're still able to maintain production and body condition.

Group four could be moved around in this list depending on the goals of your operation. At this time, with drought on the horizon keeping younger animals to expand your herd is likely not needed unless you have specific herd genetic changes you are trying to accomplish and have bred specially for those replacement prospects. In that case, you may still choose to keep fewer of these replacements. Remember that first calf heifers are the toughest group to breed back for their second calf: they require extra nutrition to care for their calf and rebreed while still growing themselves. In a drought year those young replacements are going to require even more extra management to ensure they don't fall out of the herd and fail to rebreed as three-year olds.

Groups five and six are similar and could easily be switched up. Older cows with calves at their side are going to be a little more profitable at the sale barn compared to older cows without - sell them while still in good condition and before they fail to rebreed. Thin cows with calves are a similar situation. Keeping animals in good condition during drought is already a tough prospect, adding weight to thin animals is even tougher.

The last group of animals is our core genetic base: the good condition mid aged cows that are calving yearly. These are our high performing animals and the ones most likely to stay in the herd even though a tough drought.



## **OTHER DROUGHT MANAGEMENT TOOLS**

In addition to keeping records, having a plan, and culling early there are a few other tools in our toolbox to help us get through drought.



## Early Weaning Calves

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- Reduces cow's nutritional requirements (lactation is the biggest caloric need)
- Can improve rebreeding rates for the next year's calf crop
- May need to supplement feed calves

<https://www.ag.ndsu.edu/drought/feeds-and-feeding/early-weaning-beef-calves>

This is another tool in your toolbox to help your operation weather a drought situation. You can opt to wean calves off of their mothers at a younger age than normal, usually around 3-6 months. This allows the cow, especially those two-year-old first calf heifers, more time to recover and prepare to rebreed. This could help to preserve your pregnancy rates during drought. You may choose to pull all the calves early, or just certain “at risk” populations such as your first calf heifers. Calves have been successfully weaned as young as 60 days, however the 3-6 month window is preferable.

Depending on age, calves may need supplemental feeding to reach their growth potential. Keep in mind they may need more assistance learning to eat from a bunk, and feed palatability will be a concern for these young animals. For more information on caring for early weaned calves, this article from North Dakota State University has some helpful tips and guidelines. The biggest benefit to early weaning calves is seen in the reproductive improvements for the cow herd.



## Supplemental Feeding

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- Need to have a place to hold cattle for feeding
- Expense associated with cost/labor + potential shortages during drought = higher cost
- May be necessary to preserve cow herd genetics

Supplemental feeding is another way we can help preserve our ranching operation during drought. Consider in your ranch plan when or if supplemental feeding fits. It's important to note that some federal lands do not allow supplemental feeding, you may need a place on private or another land type where you can hold those cattle for feeding. There is a lot of expense associated, not just the cost of the feed but the labor to feed it. Additionally, feed costs often increase significantly during drought due to shortages. While not an ideal situation, sometimes supplemental feeding is necessary to preserve the genetics of your herd.



## Cow supplementation

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- Energy vs Protein supplement
- Inventory herd sort and feed by age and production status
- Remember to supplement macro and micro minerals

<https://extension.arizona.edu/pubs/protein-supplementation>

There are two types of supplemental feeding: feeding hay or using a protein supplement. Feeding hay provides cattle with energy in the form of calories. This is the best option if you are in a situation where you have no grass or forage on the rangeland. Cattle will require 1.5 to 2% of their body weight daily in hay, depending on quality. To help stretch hay resources a little further, first inventory the herd and cull the least productive animals. Then, if possible, sort the remaining animals by age and production status and feed groups accordingly. Dry cattle won't require as much daily forage as lactating cattle, splitting them into two or more groups for feeding can help reduce overfeeding of animals with lower energy requirements.

Protein supplementation is best used when you have significant forage resources, but they are of very poor quality. Remember that a cow's rumen functions like a large fermentation chamber and is full of microbiota (bacteria). These bacteria ferment forages and produce volatile fatty acids which the cow uses. This process allows cattle to consume relatively low-quality forages compared to other animals like horses. However, when the protein content in a cow's diet drops below the 6.25% mark, the protein can no longer support the bacterial population of the rumen. This reduction in rumen microbiome reduces the cow's ability to digest forage and decreases her dry matter intake. In the situation where we have significant forage resources, perhaps some of last year's forage in an ungrazed pasture, we can use a protein supplement to bring up the overall

level of protein in the cow's diet and enable her to utilize these forage resources. For more information on protein supplementation, check out the University of Arizona publication at the link on this slide.

Even cattle in good condition can suffer decreased performance when deficient in minerals, both macro and micro. Even high quality Arizona forages are notoriously short in key micro nutrients (especially copper, selenium, and sometimes zinc) as well as the macro nutrient potassium, and poor quality forage is even more likely to be short in these areas. Allowing cattle free choice access to a good quality mineral supplement is an easy way to help minimize potential production losses from mineral deficiencies – just be aware of the salt toxicity issue as discussed earlier.



## Without management drought effects will devastate your herd

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- The most productive cows are usually the cows that are lost without management support
- First calf heifers and second calf cows are at very high risk
- Having a plan can help you ride out drought

To wrap up, without a management plan in place drought effects will devastate your herd and your operation. In particular, first calf heifers and second calf cows are at very high risk of failing to reproduce during drought. Without intervention and management support, the most productive, and therefore most genetically desirable cows, will usually be the ones lost as they put all of their resources into reproduction. Nonproductive cows require fewer resources and will survive even on drought stricken landscapes. By putting a sound management plan into place before a drought situation and proactively making ranch improvements, you will be in a much better position to ride out the inevitable Arizona drought while maintaining cow productivity and herd genetics, preserving rangelands, and reducing financial risk.



## Arizona's ALIRT Program



If you have a significant, unexplained death loss event the ALIRT program can help you and your vet determine the cause

- If an ALIRT response is approved, the program will pay for veterinary costs and diagnostic testing including necropsy, toxicity, and plant identification
- Goal of the program is to facilitate a rapid response and diagnosis to unexplained livestock deaths

To learn more: <https://extension.arizona.edu/alirt>

I want to end with a plug for Arizona's Livestock Incident Response Team, or ALIRT program. This program is here to help producers who experience significant and unexplained death loss. It's a cooperative effort between University of Arizona Cooperative Extension, the Arizona Department of Agriculture, the USDA, and the Arizona Cattle Growers' Association. There is a coordinating committee composed of representatives from these organizations as well as Arizona Game and Fish and Arizona livestock veterinarians.

If a producer experiences a significant death loss event beyond normal production losses, they can ask for an ALIRT response through their local vet or by contacting their local extension agent, the Arizona Veterinary Diagnostic Lab, the State Veterinarians Office, or their local AZDA Livestock officer. If a response is approved, a team is sent to collect critical information as quickly as possible, and funding is available to pay veterinary and diagnostic testing costs as well as experts such as range or toxic plant experts. ALIRT responses are designed to be as rapid as possible – usually a team is sent out the same day or the next day – to facilitate a successful diagnosis. To learn more about the program check [extension.arizona.edu/alirt](https://extension.arizona.edu/alirt)



Questions?

I hope you walk away from this presentation with some ideas on how to better prepare your operation to survive drought. I would be happy to answer any questions.