

In The Cattle Markets

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Forage Production, Beef Cows, and Stocking Density and their Implications for Partial Herd Liquidation due to Drought

Approximately 654 million acres are used for livestock grazing (ERS 2018) or approximately 35% of the total land area in the continental USA. The total acres under grazing have fluctuated through time ranging from a low of 583 million acres in the 1990s to a high of 654 million acres in the 2010s (see Table 1 panel (a)). Fluctuations in grazed land have also varied across the US' diverse geography. For example, the Mountain region consists of approximately 55% of all grazed land, Southern Plains 15%, and Northern Plains 12%. All other regions have between 1-3% of the total grazed land (see Table 1 panel (b)).

Historically, beef cow herds have tended to follow the availability of cheap nutrient-rich forage often in the form of grass and crop residue. For example, the Mountain region consists of about 15% of the total beef cow herd and generally relies on federally owned land that is leased back to producers during the grazing period. During winter, cattle are put on private pastures or fed harvested forages. The Southern and Northern Plains have 18% and 15% of the total beef cow herd, respectively, and have a large amount of private native grassland and expansive row crop production during grazing. Cattle are supplemented with harvested forages, protein concentrates, and crop residues during winter. All other regions have between 4-8% of the total beef cow herd and generally rely on improved pastures that can be utilized year-round with minor additional supplements. Historically, the share of beef cow herd by geographical region has not substantially varied showing some consistency in the ability to use feed resources.

Availability of pasture to graze or total beef cows within a region do not tell us about how efficient each region is. The stocking rate (acres per beef cow) is one measure of efficiency where a lower ratio suggests greater efficiency (i.e. fewer acres required per cow). Table 1 panel (c) shows stocking rates by region and by decade for the continental US. While the Mountain, Southern Plains, and Northern Plains have both the largest amount of grazed land and beef cows, these regions also have the highest stocking rate on average. The Mountain region required approximately 50 grazed acres per beef cow, by far the highest of any region. The Southern Plains required 15 acres per beef cow and the Northern Plains required 11 acres per beef cow. The most efficient regions, at least from the stocking rate measure, were the Northeast, Lake States, and Appalachian Region. On average, these regions required 1.5 grazed acres per beef cow. As previously mentioned, these stocking rates are in part reflective of the climate, feed resources, and pasture improvements.

So what do grazed pasture, beef cow populations, and stocking density tell us about the potential impacts of beef cow herd liquidation due to drought? Areas with lower stocking rates are likely areas that are at more risk to adverse weather conditions since they rely upon either seasonal or harvested feed resources to sustain a beef cow herd. Further, in the absence of seasonal forage, there are not large amounts of crop residues or protein concentrates from ethanol plants to supplement the lack of forage. Figure 1 shows the most recent Drought Monitor map and confirms the Mountain region and parts of the Northern Plains region are currently the most affected by drought conditions. USDA Pasture and Forage Conditions report confirmed these findings last week indicating that nearly 50% of US range and pasture was rated as either poor or very poor. As previously mentioned, there are regional differences in range and pasture ratings and one reason this number is so high is that over 70% of the total grazed range and pasture are in a D1 (moderate drought) level or greater.

Moving into this forage production year, producers will have two decisions to make: 1) destocking or 2) depopulating. Depopulation means selling cows, heifer, yearlings, and calves to fit the available forage. Destocking means not sell animals, but cattle are either moved to newly obtained pasture, rented or purchased, or purchased hay for the current herd size. With the US beef cow herd peaking in 2019 and beginning its liquidation process, increasing drought pressure could only accelerate this liquidation process.

So what strategy should producers who are wanting to maximize profits do given drought has occurred at the trough of the cattle price cycle? Work by Wyoming ag economists has modeled the producer profit-maximizing decision in a drought conditional on where the industry is at in the cattle price cycle and length of drought (Bastian et al. 2008). They modeled a 3- and 4-year drought conditions using a producer strategy for either partial herd liquidation and/or purchase of additional hay as a management strategy, given either a peak-to-peak or trough-to-trough cattle price cycle. They find that in the short run, partial liquidation of cattle tended to provide better returns than purchasing feed to overcome constrained forage supplies and that partial liquidation tended to be less risky and create potentially less financial stress than purchasing feed. Further, purchasing additional feed only provided positive returns when prices were stronger overall during a trough-to-trough cattle price cycle as compared to the peak-to-peak cattle price cycle scenario. Thus, given we are at the trough of the price cycle, risk-averse producers are more likely to partially liquidate their beef cow herd rather than to buy feed resources. However, if producers believe that prices are likely to be stronger, on average, during the upcoming trough-to-trough cycle then they will buy feed resources. Given the increasing volatility in the cattle markets, I believe that most producers are more likely to at least partially liquidate their beef cow herd rather than buy feed resources. This of course assumes no indemnity payouts from Pasture, Range, and Forage Insurance (PRF). A producer who has already protected forage with PRF is more likely to buy additional feed resources than to partially liquidate their herd.

What this potential partial beef cow herd liquidation means for cull cow and feeder cattle prices will likely differ based on geographical region. If producers decide to liquidate, then the cull cow prices will come down mostly in the Mountain and Northern Plains region. Cull cow prices are likely to be unaffected in other regions because beef cow markets are generally assumed to be regionally based on cow genetics rather than subject to market arbitrage. Under a situation of

worsening drought, more feeder cattle will enter feedlots earlier than expected lowering feeder cattle prices. With the influx of liquidated feeder cattle from the Mountain and Pacific regions, Northern and Southern Plains feedlots will be able to get feeder cattle cheaper there than from other regions. Thus, if drought conditions worsen in the Mountain and Pacific region, then feedlot demand for feeder cattle in Southeast and Appalachian regions will likely decrease. A drought scenario combined with elevated corn and soybean prices is a worst-case scenario. With elevated feed costs, feedlots would have further incentives to delay feeder cattle placements, especially lighter feeder cattle, since the cost of gain would be too high. This would put further downward pressure on feeder cattle prices. Risk management in the form of USDA-RMA Livestock Risk Protection or CME futures and options can help mitigate some of these potential downward price movements and likely merit a closer look by producers this production year.

References

Bastian, Christopher T., Padmaja Ponnamaneni, Sian Mooney, John P. Ritten, W. Marshall Frasier, Steven I. Paisley, Michael A. Smith, and Wendy J. Umberger. "Range livestock strategies given extended drought and different price cycles." *Journal of ASFMRA* (2009): 153-163.

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Supporting Tables

Table 1. Historical Grazed Pasture by US Geographical Region, 1940-2012

	1940's	1950's	1960's	1970's	1980's	1990's	2000's	2012
<i>Panel (a): Grazed Pasture (per 1'000 acre)^a</i>								
Northeast	8,527	7,593	5,136	3,177	2,695	2,907	3,826	4,916
Lake States	8,109	7,277	7,330	5,003	5,525	5,137	6,440	8,414
Corn Belt	21,445	19,318	17,142	12,852	13,002	11,952	14,734	18,200
Northern Plains	79,675	79,073	76,808	73,247	68,417	69,003	72,931	79,766
Appalachian	11,373	11,567	9,603	6,631	6,441	5,702	8,402	13,890
Southeast	7,731	11,953	11,531	10,313	10,216	9,449	9,285	10,648
Delta States	6,616	8,930	8,933	6,613	7,349	5,945	6,727	9,116
Southern Plains	99,574	106,796	114,864	111,758	122,348	117,019	118,096	124,359
Mountain	343,552	321,862	313,939	306,977	303,393	303,087	303,110	326,867
Pacific	58,687	56,908	53,451	53,178	52,139	53,312	54,689	57,843
48 States ^b	645,288	631,274	618,734	589,746	591,522	583,511	598,240	654,020
<i>Panel (b): Percent of Total Pasture Land (%)</i>								
Northeast	1.32	1.20	0.83	0.54	0.46	0.50	0.64	0.75
Lake States	1.26	1.15	1.18	0.85	0.93	0.88	1.08	1.29
Corn Belt	3.32	3.06	2.77	2.18	2.20	2.05	2.46	2.78
Northern Plains	12.35	12.53	12.41	12.42	11.57	11.83	12.19	12.20
Appalachian	1.76	1.83	1.55	1.12	1.09	0.98	1.40	2.12
Southeast	1.20	1.89	1.86	1.75	1.73	1.62	1.55	1.63
Delta States	1.03	1.41	1.44	1.12	1.24	1.02	1.12	1.39
Southern Plains	15.43	16.92	18.56	18.95	20.68	20.05	19.74	19.01
Mountain	53.24	50.99	50.74	52.05	51.29	51.94	50.67	49.98
Pacific	9.09	9.01	8.64	9.02	8.81	9.14	9.14	8.84
48 States ^b	99.89	99.65	99.47	99.57	99.60	99.63	99.69	99.78
<i>Panel (c): Grazed Pasture Acres per Beef Cow^c</i>								
Northeast						1.36	2.01	2.82
Lake States						1.69	2.29	2.98
Corn Belt						2.27	3.04	4.32
Northern Plains						10.90	11.49	13.78
Appalachian						1.36	2.14	4.18
Southeast						3.02	3.40	4.14
Delta States						2.52	3.24	5.11
Southern Plains						14.91	14.97	19.17
Mountain						49.02	50.79	55.56
Pacific						14.19	14.94	16.49
48 States ^b						13.37	14.18	17.15

Source: ERS (2020) and authors calculations

Notes: ^a Grassland and other nonforested pasture and range in farms plus estimates of open or nonforested grazing land not in farms; ^b Distributions may not add to totals due to rounding; ^c USDA-NASS Agriculture Census data is only readily available from 1997 to 2017.

Supporting Figures

U.S. Drought Monitor

May 4, 2021
(Released Thursday, May 6, 2021)
Valid 8 a.m. EDT

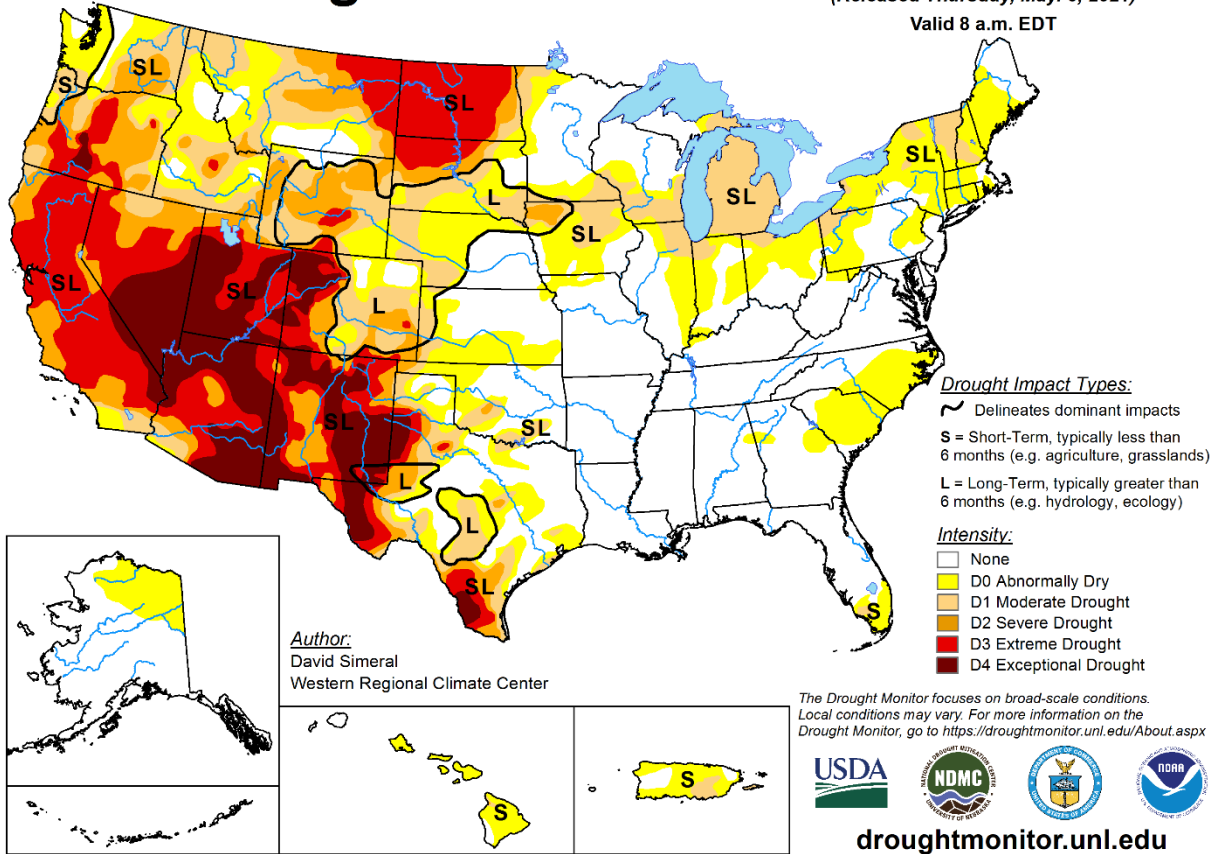


Figure 1. Drought Monitor Map

Markets

Data Source: USDA-AMS Market News		Week of 5/7/21	Week of 4/30/21	Week of 5/8/20
5-Area Fed Steer	all grades, live weight, \$/cwt	\$118.36	\$118.89	\$104.50
	all grades, dressed weight, \$/cwt	\$188.53	\$190.44	\$159.85
Boxed Beef	Choice Price, 600-900 lb., \$/cwt	\$303.51	\$291.79	\$441.53
	Choice-Select Spread, \$/cwt	\$16.81	\$12.65	\$18.15
700-800 lb. Feeder Steer	Montana 3-market, \$/cwt	\$135.00	\$140.73	\$132.74
	Nebraska 7-market, \$/cwt	\$139.74	\$143.08	\$135.26
	Oklahoma 8-market, \$/cwt	\$135.25	\$137.38	\$128.87
500-600 lb. Feeder Steer	Montana 3-market, \$/cwt	\$162.64	\$179.24	\$154.94
	Nebraska 7-market, \$/cwt	\$173.36	\$171.42	\$159.92
	Oklahoma 8-market, \$/cwt	\$162.50	\$162.58	\$149.15
Feed Grains	Corn, Omaha, NE, \$/bu. (Thursday)	\$7.45	\$6.68	\$2.97
	DDGS, Nebraska, \$/ton	\$250.00	\$232.50	\$167.50