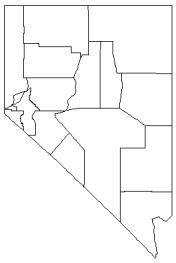
TECHNICAL REPORT
UCED 2020/21-01

June 2020 Nevada Agricultural Outlook
COVID Impacts on Cow-calf, Dairy, and Alfalfa Hay



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Introduction

The outlook for agriculture is dependent on a number of factors including the economy, domestic and international policy shifts, technological advancements, resource endowments and availability, and changing consumer tastes and preferences. But the current outlook is dominated by the COVID-19 pandemic that has gripped the world since early 2020 and which is likely to persist for at least several more months. The world has had to drastically change in response.

COVID-19 has impacted nearly every aspect of life around the globe, from international business to daily living for individuals, and is first and foremost a biological issue. Social adjustments, economic malaise, industrial contractions and outright shutdowns that have disrupted supply chains are but symptoms of the pandemic. Before the world can return to normal operations, the biological aspects of the pandemic must be addressed and at least controlled. How long that will take is anybody's guess. The hope for a vaccine at the end of the year is not a sure thing, and the resulting uncertainty continues to disrupt markets and market expectations. For these reasons, this agricultural outlook is but a best estimate given a set of assumptions about gradual recovery both in terms of the pandemic and resulting economic and ag industry recovery. At the time of this writing there have been signs of emerging recovery, but there are also worsening conditions in areas that have relaxed social constraints.

COVID-19 Supply Chain Impacts

Nevada agricultural markets, like all global agriculture markets, have been impacted by supply chain disruptions directly attributed to the COVID-19 pandemic. The agricultural supply chain connects livestock and crop producers to processing and packing firms who in turn supply wholesalers, who then supply commercial, institutional, and retail customers who ultimately deliver agriculture products directly to individuals and households. Traditionally, disruptions to the supply chain resulted from regional disasters like fire, seasonal impacts like drought, or industry-specific disturbances such as labor disputes or regulatory challenges. However, disruptions stemming from COVID-19 have been global rather than regional, occurring with uncertainty of resolution rather than seasonal, and impact all sectors along the supply chain including producers, transportation, processors, points-of-purchase, and consumers.

Wuhan, China was the first global region to report COVID-19 in December 2019. The contagion spread rapidly during winter 2020 and by March 2020 the U.S. and most major trading partners had shuttered most of their economies and institutions such as schools, travel, tourism, transportation, and retail sectors. This resulted in dramatic drops in demand, particularly in terms of food-away-from-home that flows through institutions and dining out. Additionally, most ag processing is engineered to process and package specific to these types of commercial customers. The result was a backlog of livestock and dairy (in particular) on the producer end,

and shortages of ag product availability on the consumer end. Shortage of labor in processing and transportation due to illness and travel closures exacerbated an already strained supply chain.

Several characteristics of the livestock processing and packing industry contributed to a meat supply chain choke-point - high rate of industry consolidation, capital asset fixity, and skilled labor working closely indoors. The consolidation and fixity of the engineered product lines cannot easily adapt to shifts in demand away from food-away-from-home to retail. Proximity of skilled workers encouraged rapid spread of COVID-19 requiring temporary closure of many plants. These combined processing challenges resulted in a backlog of animals pending slaughter and livestock producers having to incur additional costs of holding, or euthanizing, animals. The backlog of animals contributed to retail meat shortages which were further exacerbated by above average retail purchases as consumers hedged against perceived future shortages during the initial COVID-19 shelter-at-home measures across the U.S. Additionally, timely re-stocking of retail meat was hampered by transportation glitches related to travel restrictions and labor shortages. The outcome was significantly higher retail prices, processor margins, and lower prices paid to livestock producers.

Dairy producers realized the largest drops in producer prices during the COVID-19 pandemic. Unlike livestock producers, milk production occurs on a daily basis and producers don't have the option of 'holding' product. Dairy producers have been particularly impacted by the shift from institutional and restaurant demand to retail demand, especially for liquid milk, cheese, and butter. Similar to meat production, adjustment to dairy processing lines designed to package products for commercial end-users to retail packaging for individual end-users requires significant investments of time and money. Moreover, the peak of the U.S. COVID-19 quarantine coincided with annual peak milk production that occurs during calving season. Producer milk prices dropped as much as 80%, resulting in wide scale dumping of fluid milk.

Nevada livestock and dairy producers fared slightly better than other U.S. producers, in part because of production model – NV livestock producers sell live animals rather than feeding for slaughter and NV dairy producers are somewhat buffered by contracts and a state processing sector concentrated more in whole milk powder.

The Outlook

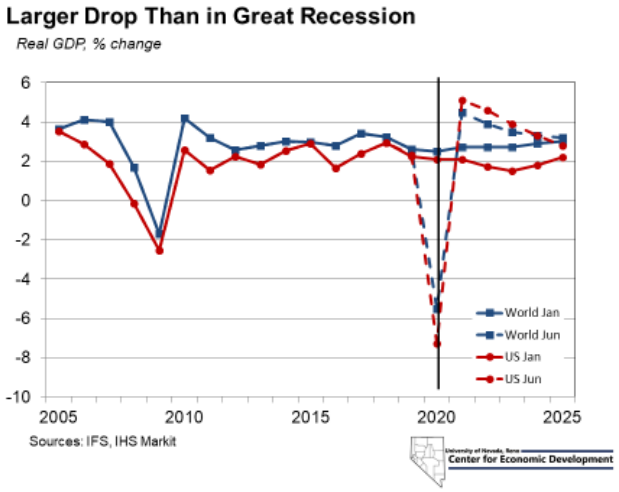
Estimates of the impact of the coronavirus on the U.S. and global economy, in general, and on agriculture in particular are presented in the remainder of this document. For Nevada, we will concentrate on the cow-calf, dairy, and alfalfa hay sectors, while recognizing that other state agricultural products are also important. We use the FAPRI January global, U.S. and Nevada outlooks as a baseline to compare the estimates from the FAPRI-Missouri June baseline update that were used to provide information to the Nevada agricultural models.

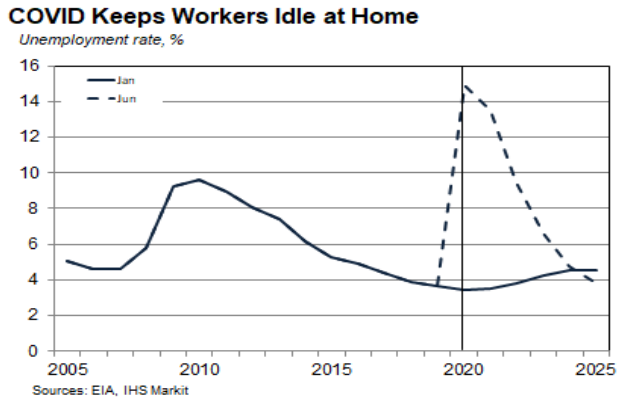
The Economy

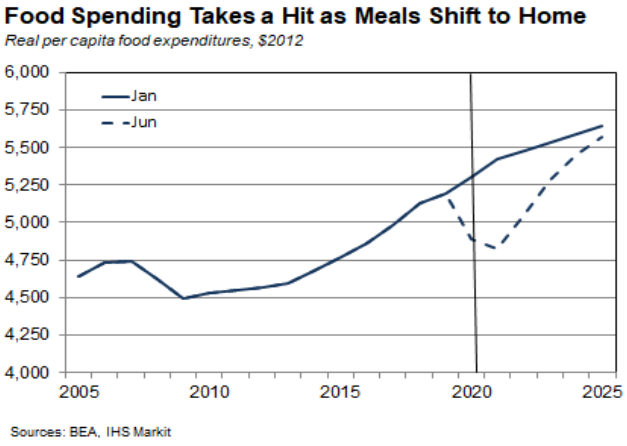
The disruption to the U.S. and global economies has been rapid and severe. The expectation is that the depth of the downturn in economic activity will be greater than what was experienced during the Great Recession. The path to recovery is not likely to be smooth or quick, and the economy is likely to feel impacts over several years. The entire world will continue to suffer from the economic downturn, disrupting not only domestic activity but have large impacts on trade for some time to come. Even if growth commences next year, it will take two to three years to recover the level of economic activity seen before the pandemic.

Social restrictions have severely reduced our engagement in typical activities such as retail, entertainment, and have also curtailed services consumption. The resulting loss of jobs has pushed the unemployment rate beyond that of the last recession. Even with federal unemployment provisions, incomes have been cut, exacerbating the ability to purchase. The combination of social restrictions and job losses create an unemployment situation that feeds on itself.

One area that has seen a dramatic shift has been where we eat. Restaurant closures and reduced household budgets have caused more meals to be eaten at home. Reduced consumption because of reduced availability of dining options, but the predominant factor has been that more expensive restaurant eating is being replaced by less costly home consumption. It will take several years for overall consumption to recover. However, there could be one or more cycles of the pandemic ahead that will prevent a smooth and steady recovery.





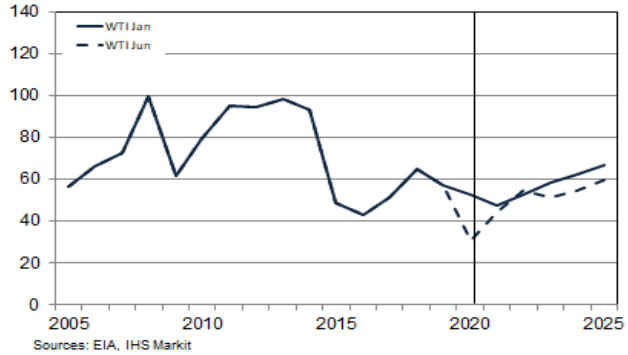


The sharp reduction in economic activity, including travel restrictions, caused a glut in oil inventories around the world and prices collapsed. The situation became so drastic that oil prices even temporarily turned negative to encourage movement of crude and products through the supply chain until producers were able to curtail output. But several months later, crude prices remain low. Prices are expected to rebound in 2021 as the global oil balance adjusts, but long-term prices are likely to remain low.

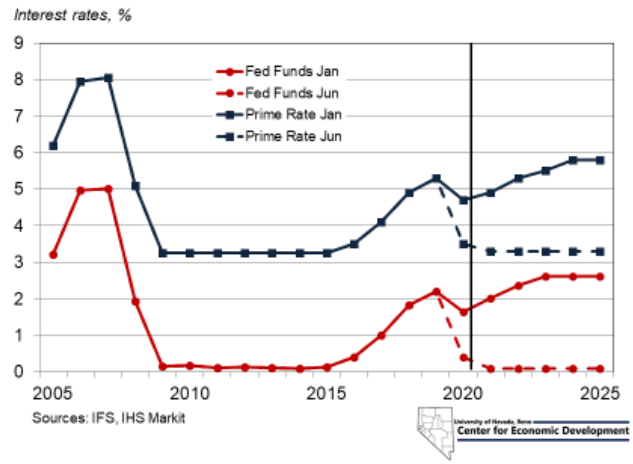
Interest rates are substantially lower. The reasons are lower demand for major consumer goods, less investment by companies, as well as policy moves to help buoy the economy. Similar to recovery from the last recession, the duration of low interest rates following the pandemic is expected to last several years. The need to stimulate the economy will induce the Fed to keep borrowing rates low, helping commercial lenders maintain low rates, as well. As long as inflation remains under control, low interest rates will be possible.

A lower level of economic activity has, and will continue to, decrease demand for goods and services, including those that are necessary for agricultural production. Inputs such as fuels that are petroleum based will see much lower prices. This will also reduce transportation costs for other inputs. Although the percent change in fuels will be similar to what was expected earlier this year, it is starting from a substantially lower base. Higher unemployment will reduce labor costs for several years, and services that are labor dependent will be cheaper, as well. While agricultural producer prices are anticipated to remain subdued, lower production costs will mitigate the impact on producers' bottom lines.

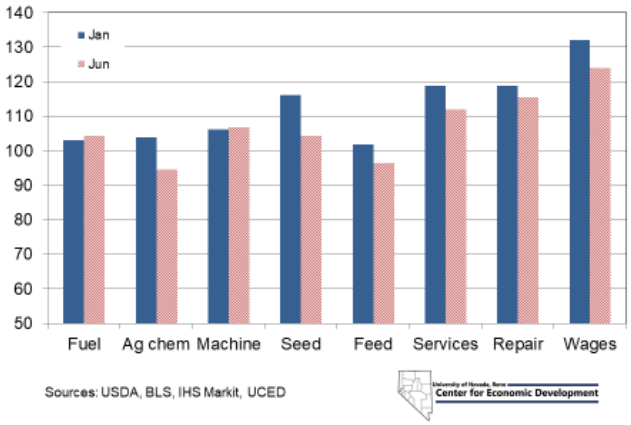
Economic Weakness Induces Less Oil Demand



Interest Rates Will Help Reduce Borrowing Costs



Slower Cost Increases Ahead

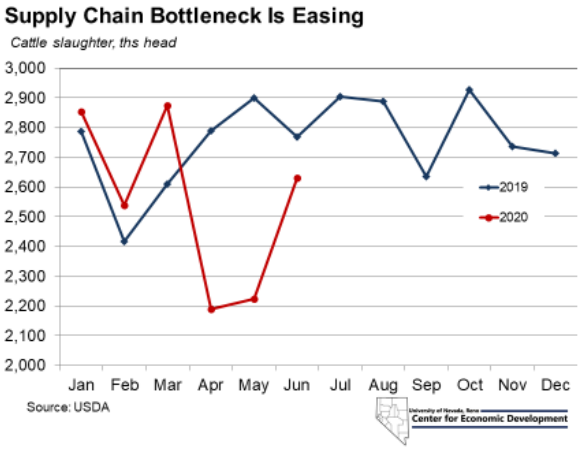


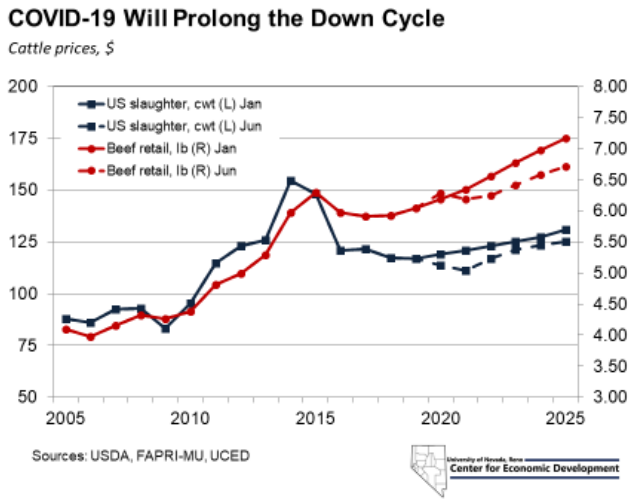
Cow-calf Industry

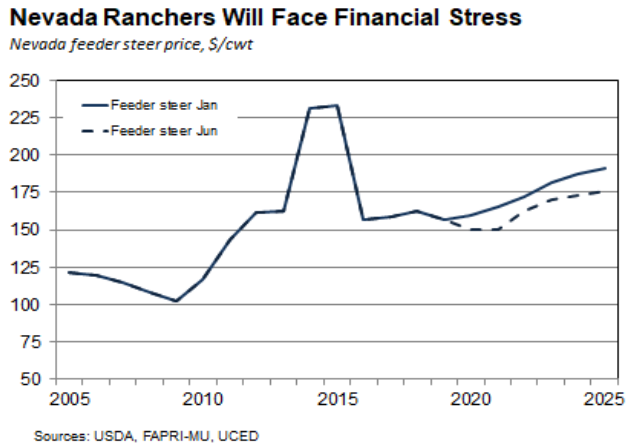
In April and May of this year, COVID-19 hit meat processors causing closures in some of the largest plants in the country. This caused a sharp reduction in the number of animals slaughtered and processed, affecting not only cattle, but also hogs, sheep, and poultry. A shortage of meat at the consumer level developed while producers could not move animals into feedlots and slaughter facilities. By June, this bottleneck began to ease and processing of all species began to recover and placements rose on feedlots. At the end of June, weekly slaughter equaled that of a year earlier.

The initial impact of processor closures was a rise in retail prices of beef but a sharp drop in prices of live cattle. As processing resumed, retail prices began to soften while producer prices rose, but not to levels seen before the pandemic as there still exists a glut of cattle in feedlots and at cow-calf operations. As the economy recovers, fallout from the COVID-19 recession will linger, depressing retail demand and causing lower prices than expected in January and weaker prices for cattle producers.

The outlook for Nevada cattle ranchers is for lower prices than expected just six months ago. That financial stress is expected to persist into 2021. But even as economic growth returns, the effect on the overall level of economic activity will persist and Nevada producers will see consistently lower prices than was projected earlier in 2020, although prices will return to levels exceeding those of the past recession in subsequent years. However, prices will not approach those of 2014 and 2015.







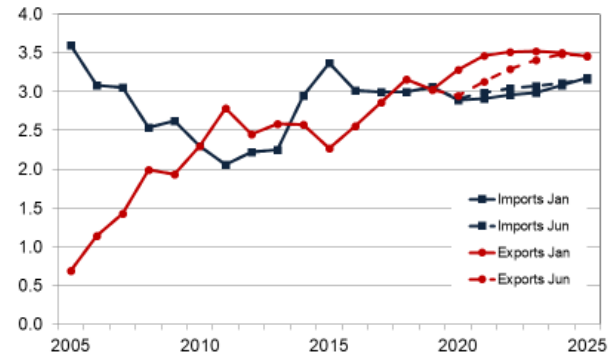
The health and economic fallout felt around the world from this pandemic is impacting world trade. Global markets have shrunk in recent months, including for agricultural products. Beef trade is being hit by both a reluctance to allow shipments into some countries and the economic impacts of the pandemic. For the U.S., beef imports are not likely to be notably different than projected in January, but exports are being substantially curtailed, with several years expected before recovery to earlier expectations.

Costs of production will decline modestly in the next year. Fuel and feed, in particular will cost less, along with labor that affects both on-farm costs and those for important ag services, as well. However, cattle prices will fall much more, especially for 2020 and 2021, severely squeezing producers' margins. Whereas the past several years were not stellar in terms of financial robustness, this year and next are anticipated to be even worse, with net returns the lowest since early in the last recession. Recovery is expected to begin in 2022 with profits rising for the following several years.

The size of Nevada's cattle inventories has shrunk over the years. Among the reasons is movement of younger people off the ranch, economic risks, limited land available for grazing, and competition for that land from other uses. Nevada's cattle industry is closely tied to the availability of federal grazing land, specifically that managed by the BLM and Forest Service. With little expectations of increasing grazing allotments and mediocre economics ahead, it is not expected that cattle numbers will increase in the state during this outlook.

Hitting the World Market: Trade Surplus Narrows

Beef trade, bil lb

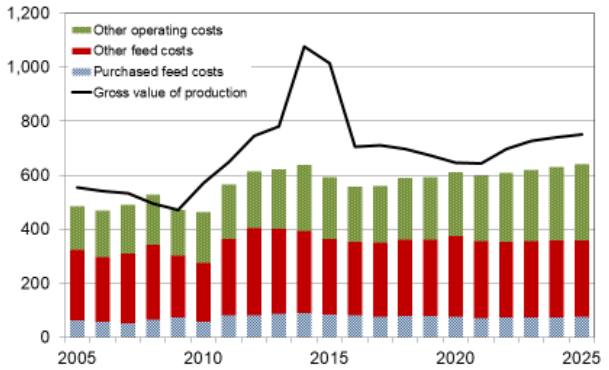


Sources: USDA, FAPRI-MU, UCED

Center for Economic Development

Prices Will Fall More Than Costs, Profits Squeezed

Basin & Range cow-calf, $/bred cow

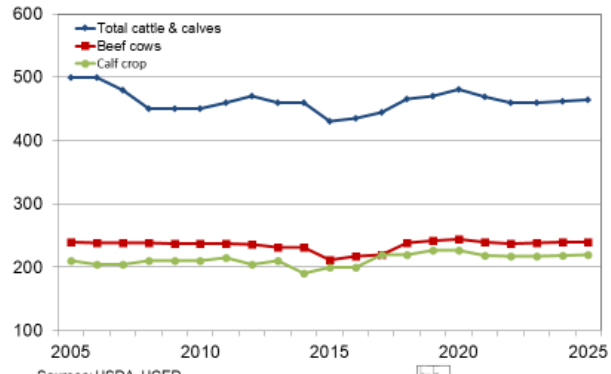


Sources: USDA, UCED

Center for Economic Development

Economics, Available Grazing Will Limit Herd Size

Nevada cattle, 1,000 head



Sources: USDA, UCED

Center for Economic Development

Dairy

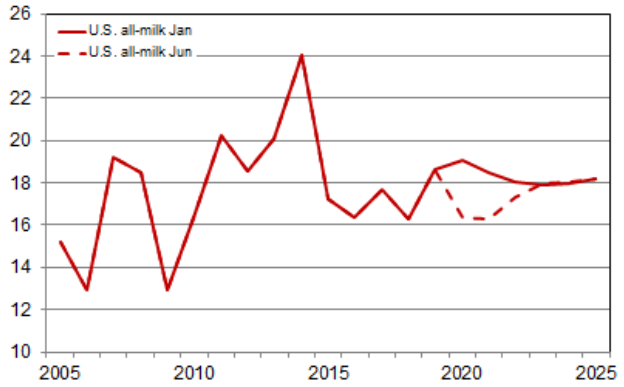
The same general health and economic forces that are impacting the meat sector are also disrupting the dairy sector. Processing has been curtailed by workers contracting the virus in milk processing plants. Demand has been hampered by constraints to consumption, particularly from closures at restaurants and institutions such as schools, but also by loss of incomes. With reduced bottling and processing, prices fell sharply for several months to levels not seen since the Great Recession. There has been some recovery in processing and prices.

For Nevada dairymen the story is largely the same. Loss of local markets for fluid milk, including for school breakfasts and lunches, and reduced processing both in Nevada and California has caused supplies to outstrip demand. While Northern Nevada producers have some temporary protection from contracts and the ongoing operation of the whole milk powder plant in Fallon, even that market has limitations. While little dumping was reported locally, producers have had to find other uses, such as calf feeding to absorb excess supplies.

While prices recovered slightly in April and May, they will not offset annual loses. Producer margins for the year, as a whole, are expected to be dismal. On average, net margins are expected to disappear, while margins above feed costs will be greatly reduced. As such, the Dairy Margin Coverage Program (DMC) will make substantial payments to producers at all margin levels. Since DMC pays on monthly rather than annual margins, payments are being made, particularly at higher margins, and will continue over the outlook period at least for part of each year.

U.S. Milk Prices Reflect National Supply Glut

Milk price, $/cwt

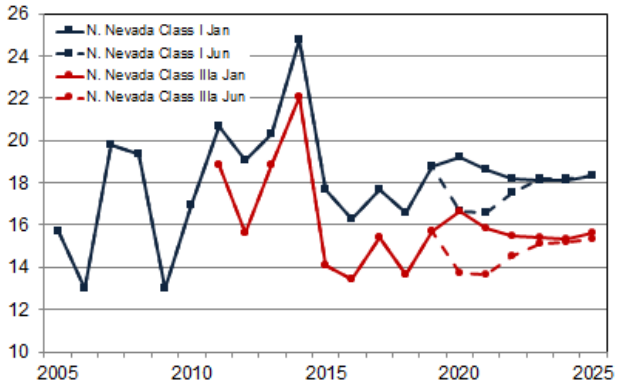


Source: Nevada Dairy Commission, USDA, FAPRI, UCED

Center for Economic Development

Northern NV Milk Prices Reflect National Supply Glut

Milk price, $/cwt

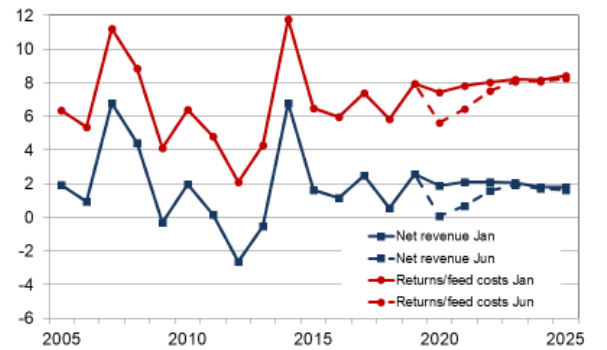


Source: Nevada Dept. of Agriculture, USDA, FAPRI, UCED

Center for Economic Development

Dairy Producers Face Tough Few Years

Nevada dairy margins, $/cwt



Sources: USDA, FAPRI-MU, UCED

Center for Economic Development

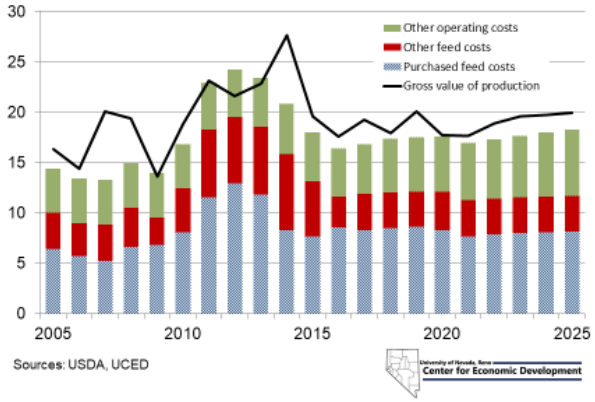
Dairy profits will be squeezed in 2020 from both the cost and revenue sides. If prices do not hold at recent highs for the remainder of the year, revenues will fall sharply. Lower milk prices on average than a year ago reduce profitability and lower cattle prices will lower returns for calf, heifer, and cow sales. Higher feed costs will further erode profits. Although grain and protein meal feeds are lower this year, hay prices, which make up a substantial amount of feed costs are higher, as Nevada hay production is off in the first half of 2020.

Northern Nevada dairy herd expansion is necessary if the Fallon whole milk powder plant is to be completely supplied locally. Before COVID-19 hit, that expansion was slower than originally hoped, and now it has ceased altogether. The poor financial environment eliminates incentives to expand existing herds or attract more operations from out of state. Once the pandemic has eased, expansion can resume, but it is not expected that the estimated 45 thousand head necessary to meet needed milk supply will be reached during this outlook period.

The anticipated market for the milk powder plants is China. However, since 2018, opportunities to export to that country have nearly disappeared. Competition from dominant New Zealand and less demand for imported whole milk powder in China have severely cut U.S. exports to that country. Furthermore, trade tensions between the U.S. and China have constrained trade opportunities. As the Phase 1 trade agreement is implemented, it will be possible to sell more whole milk powder to China. Fortunately, the Fallon plant can also produce skim milk powder, which has a much larger market, especially domestically.

Dairy Struggles With Profitability

Nevada dairy, $/cwt of milk sold

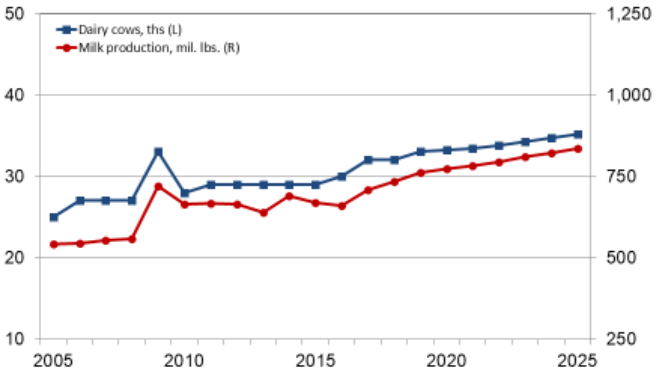


Sources: USDA, UCED

Center for Economic Development

Recent Dairy Expansion Will Take a Break

Nevada dairy

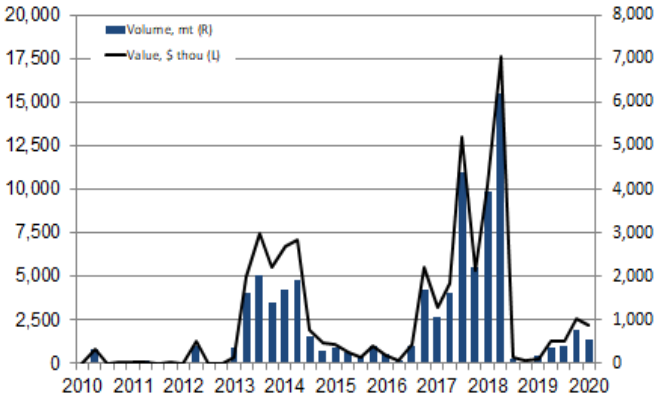


Sources: USDA, UCED

Center for Economic Development

Chinese Market Is Not There for Nevada

China, dry whole milk and cream, imports from U.S.



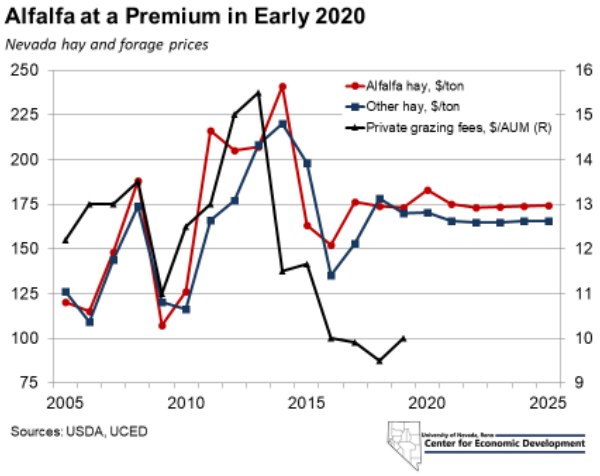
Source: USDA: Foreign Agriculture Service, GATS

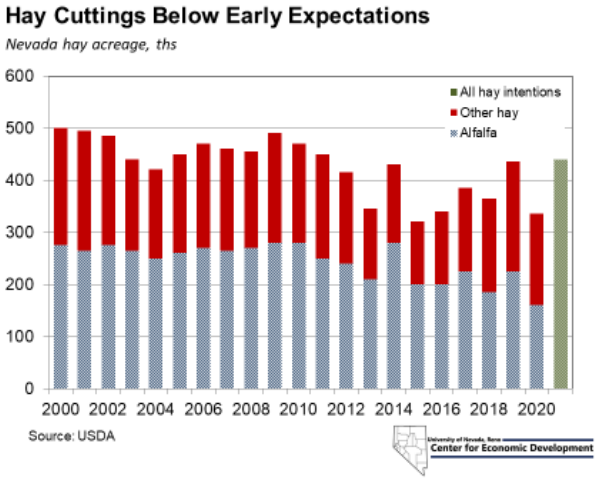
Alfalfa Hay

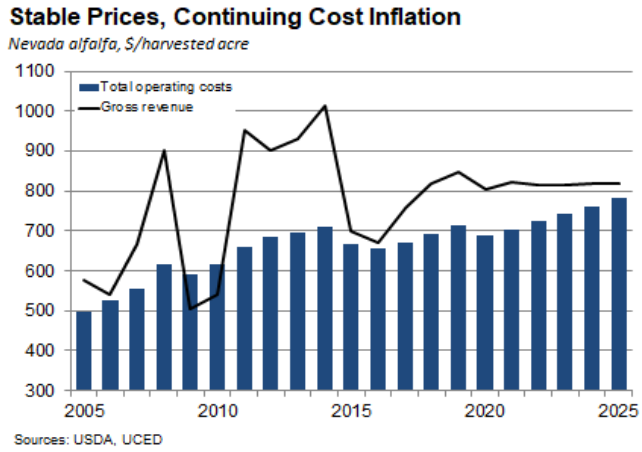
Alfalfa hay prices have risen from a year ago while grass hay is about the same. This benefits hay producers but adds to feed costs for dairy producers, and cattle producers who supplement grazing with hay and rely on hay after the grazing season. Developing drought could further erode hay production in Nevada and contribute to a severe fire season that could eliminate grazing for a few years in burn areas, making those ranchers more dependent on short supplies of hay. The price risk for hay is definitely to the upside.

Initial alfalfa cuttings in Nevada this year were well below those of a year ago. USDA estimates acreage harvested at 175 thousand acres, compared to 215 thousand acres in 2019. It is possible that the extended cool spring has dampened yields. Intentions reported in the March *Prospective Plantings* of total hay acreage for Nevada were 440 thousand acres, but with the lower harvested area thus far, USDA now estimates hay area to be 335 thousand acres. Price rationing is certain if subsequent cuttings do not exceed expectations.

Despite higher hay prices for Nevada this year, expectations of slightly lower yields result in an estimated drop in total revenues. This year's prices notwithstanding, the outlook is for stable feed prices (including hay). As such, producer revenues are also expected to change very little over the next lustrum. In contrast, most other input costs are expected to rise similar to the rate of inflation, and fuel costs exceed that rate of increase. The bottom line is that net revenues over costs will gradually shrink, although they will remain positive.







Summary

The general outlook for Nevada agriculture in the short to medium term is for relatively low prices and constrained profitability. COVID-19 is creating an uncertain environment for consumers of all products, including agricultural products. The shift in where and how we eat is expected to be mitigated somewhat as the pandemic eases, but not disappear completely in the next year or two. While there has been a resumption of activity at many processing facilities, the ominous specter of additional rounds of infection leaves the nation and world anxious and the outlook with more uncertainty than previous years.

Markets lost by Nevada cattle and dairy producers during the COVID-19 pandemic have improved significantly, but are not yet fully recovered. For cow-calf operators, there remains a smaller, albeit persistent backlog of cattle that has yet to move into slaughter and packing plants, and into feedlots, as well. Cattle prices have risen substantially in the past couple of months but remain just as substantially below those of a year ago and below expectations at the beginning of this year.

Milk prices rose sharply in June and continued at higher levels into July as processors have resumed much of their operations. In addition, cheese and butter stocks have been bolstered by federal purchases. It is likely that there has been sufficient time for dairy producers to trim herds in response to the oversupply and that lower output has contributed to a more balanced supply/demand situation for milk.

In Nevada, hay production, especially alfalfa hay, is down considerably from a year ago, producing a tight market and price strength. Lower hay acreage this year will continue to add price pressure on the state's market, increasing feed costs for already stressed livestock and dairy markets.

For the next year or two, the financial outlook for Nevada agricultural producers is uncertain, filled with increased risk, and profitability is expected to be tight for the next several years.

June 2020 Nevada Outlook Tables

Table 1. Economic Assumptions

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Real GDP growth, %										
U.S.	1.6	2.2	2.9	2.3	-7.3	5.1	4.6	3.9	3.3	2.8
World	2.6	3.3	3.2	2.6	-5.5	4.5	3.9	3.5	3.3	3.2
Interest rates, %										
Fed funds rate	0.40	1.00	1.83	2.20	0.40	0.10	0.10	0.10	0.10	0.10
Prime rate	3.51	4.10	4.90	5.28	3.54	3.25	3.25	3.25	3.25	3.25
30-yr mortgage	3.65	3.99	4.54	3.94	3.32	3.02	2.95	3.06	3.25	3.50
WTI crude oil price										
$/barrel	43.21	50.96	64.89	56.98	30.97	44.24	54.74	51.21	54.55	59.92
% change	-11.3	17.9	27.3	-12.2	-45.6	42.8	23.7	-6.4	6.5	9.8
Population, % change										
U.S.	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
World	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9

Sources: IMF, HIS Markit

Table 2. Production Cost Indices, 2015=100

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Seed	97	96	95	93	91	90	89	88	89	90
% change	-2.6	-1.2	-1.2	-2.1	-2.0	-1.6	-1.2	-0.3	0.7	1.6
Fertilizer	82	76	76	80	83	79	85	86	87	91
% change	-17.7	-7.8	0.8	5.1	2.6	-4.2	7.8	1.3	1.2	4.7
Agricultural chemicals	101	98	95	95	91	92	92	93	95	96
% change	1.1	-3.4	-3.2	0.2	-3.7	0.8	0.5	1.0	1.3	1.8
Feed	96	89	94	97	97	97	96	96	96	96
% change	-4.4	-6.5	5.4	3.1	0.1	-0.6	-0.6	0.2	0.0	-0.1
Farm machinery	101	103	105	108	108	110	112	115	118	121
% change	0.7	2.0	2.0	3.3	-0.4	2.3	1.5	2.4	2.7	2.4
Trucks & Autos	100	100	100	100	101	102	103	105	106	107
% change	0.4	0.0	-0.5	0.3	0.4	1.0	1.4	1.3	1.1	1.0
Fuels	88	100	112	116	98	104	118	121	126	133
% change	-12.4	13.7	12.5	3.5	-15.6	5.9	14.3	2.0	4.3	5.5
Wages	104	106	113	119	120	122	125	128	131	135
% change	3.6	2.8	6.0	5.5	1.2	1.2	2.4	2.6	2.6	2.7
Farm services	102	99	101	103	103	104	105	106	108	111
% change	1.7	-2.8	1.9	1.9	0.1	0.8	1.1	1.6	1.8	2.2
Farm repairs	100	102	106	108	109	111	114	116	119	122
% change	0.2	2.0	3.3	2.4	0.8	1.8	2.3	2.5	2.6	2.5
Farm supplies	100	101	105	109	110	111	113	114	116	118
% change	0.2	1.2	3.7	3.5	1.4	0.9	1.1	1.2	1.5	1.7

Sources: USDA, BLS, IHS Markit

Table 3. Nevada Agricultural Commodity Prices

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Livestock & product prices										
Feeder steers, $/cwt	156.60	159.09	162.63	156.82	150.33	149.76	162.67	169.81	172.89	175.53
Milk, $/cwt										
N. Nevada Class I	16.26	17.70	16.56	18.78	16.62	16.55	17.53	18.17	18.20	18.37
N. Nevada Class IIIa	13.41	15.43	13.66	15.70	13.71	13.65	14.55	15.14	15.16	15.32
Hay, $/ton										
Alfalfa	152	176	174	173	183	175	173	173	174	174
Other hay	135	153	178	170	170	165	165	165	165	166
Grains, $/bushel										
Wheat	4.05	4.70	5.18	4.60	4.67	4.66	4.59	4.54	4.61	4.67
Barley	5.22	4.74	4.79	4.86	4.63	4.60	4.59	4.57	4.58	4.62

Sources: USDA, FAPRI

Table 4. Nevada Estimated Returns

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Livestock and products										
Cow-calf, $/bred cow										
Gross revenue	704.62	710.20	697.14	672.84	645.68	643.29	697.28	727.18	740.06	751.10
Variable costs	556.81	560.60	589.62	592.93	610.81	598.29	608.09	619.90	630.94	641.26
Net returns	147.81	149.60	107.52	79.90	34.87	45.00	89.20	107.28	109.12	109.85
Milk, $/cwt										
Gross revenue	18.00	19.63	18.16	20.31	18.07	18.00	19.12	19.83	19.89	20.08
Variable costs	16.41	16.79	17.32	17.49	17.58	16.94	17.30	17.66	17.98	18.29
Net returns	1.59	2.84	0.84	2.82	0.49	1.05	1.82	2.16	1.90	1.79
Crops, $/acre										
Alfalfa hay										
Gross revenue	668.80	756.80	817.80	847.70	805.58	823.35	813.80	814.81	817.47	819.39
Variable costs	655.67	671.83	693.66	714.40	688.21	702.31	726.42	741.68	761.48	783.40
Net returns	13.13	84.97	124.14	133.30	117.37	121.04	87.37	73.13	55.99	35.99
Wheat										
Gross revenue	276.64	496.79	582.75	561.95	522.74	526.53	524.99	524.55	538.11	550.92
Variable costs	151.92	151.12	151.22	152.27	151.86	154.81	158.50	162.49	166.31	170.08
Net returns	124.73	345.67	431.53	409.68	370.88	371.72	366.49	362.06	371.80	380.84
Barley										
Gross revenue	377.24	500.47	538.06	592.57	517.90	519.31	523.76	527.77	534.30	544.50
Variable costs	146.85	147.11	148.34	149.22	148.40	150.66	154.41	158.51	162.35	166.16
Net returns	230.39	353.37	389.72	443.34	369.50	368.66	369.34	369.26	371.96	378.34

Sources: USDA, UCED