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# **Toward an Outlook for California Agriculture Relevant to GHG Emissions Mitigation**

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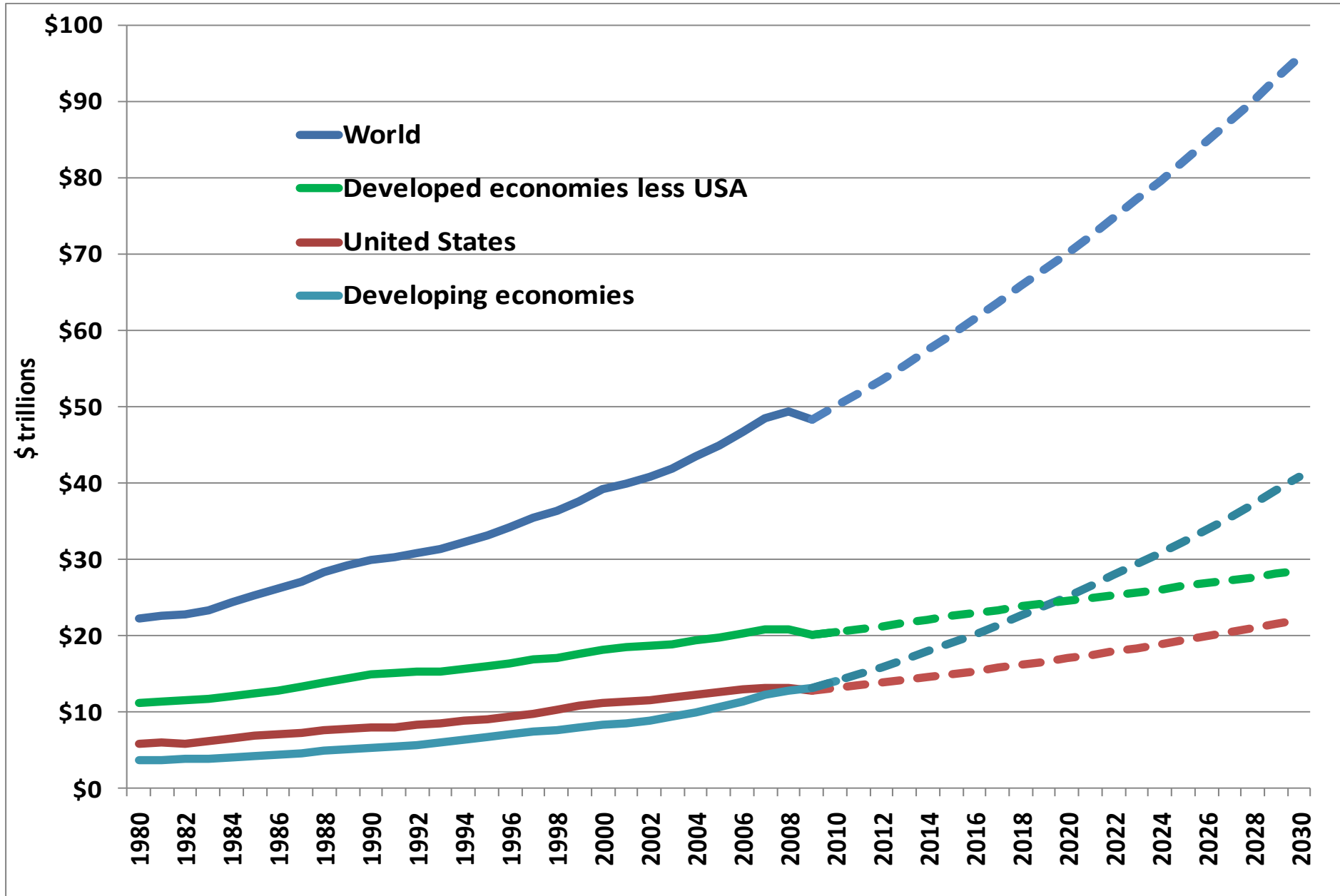
# **First steps to developing a useful set of projections for California agriculture to 2030**

- **Choice of crops and issues determined by the greenhouse gas emissions and potential for mitigation in different parts of California farming.**
- **Commodity production is constrained by scarce water, land and other resources**
- **Changes in resource availability and prices, commodity prices and shifting costs due to shift in input prices, technologies and resource supplies all determine what is produced, using which practices and how much of the available resources.**
- **We will consider first recent trends, current situation and national projections. Along the way, we will evaluate where current and expected drivers are steering California agriculture.**

## **Global markets for farm commodities have exhibited strong long-term demand trends and have several drivers**

- **Trends toward larger quantities from growth in demand and growth in supply are well established and expected to continue.**
- **Demand for farm commodities has been growing strongly for centuries because of populations and per capita income growth.**
- **Continued demand growth derives primarily from increases in income in rapidly growing regions with large populations.**
- **At high incomes, income growth matters little to demand for most food commodities, but animal protein and fruits, nuts and vegetables continues to have significant income responses at higher incomes.**
- **Uses that substitute for nonfarm commodities (energy) expand demand and may place a (variable) floor under farm prices as that demand expands more than food demand.**
- **Strong demand growth is mostly a “good news” story. It means that incomes of the world’s poor will continue to expand at rapid rates.**

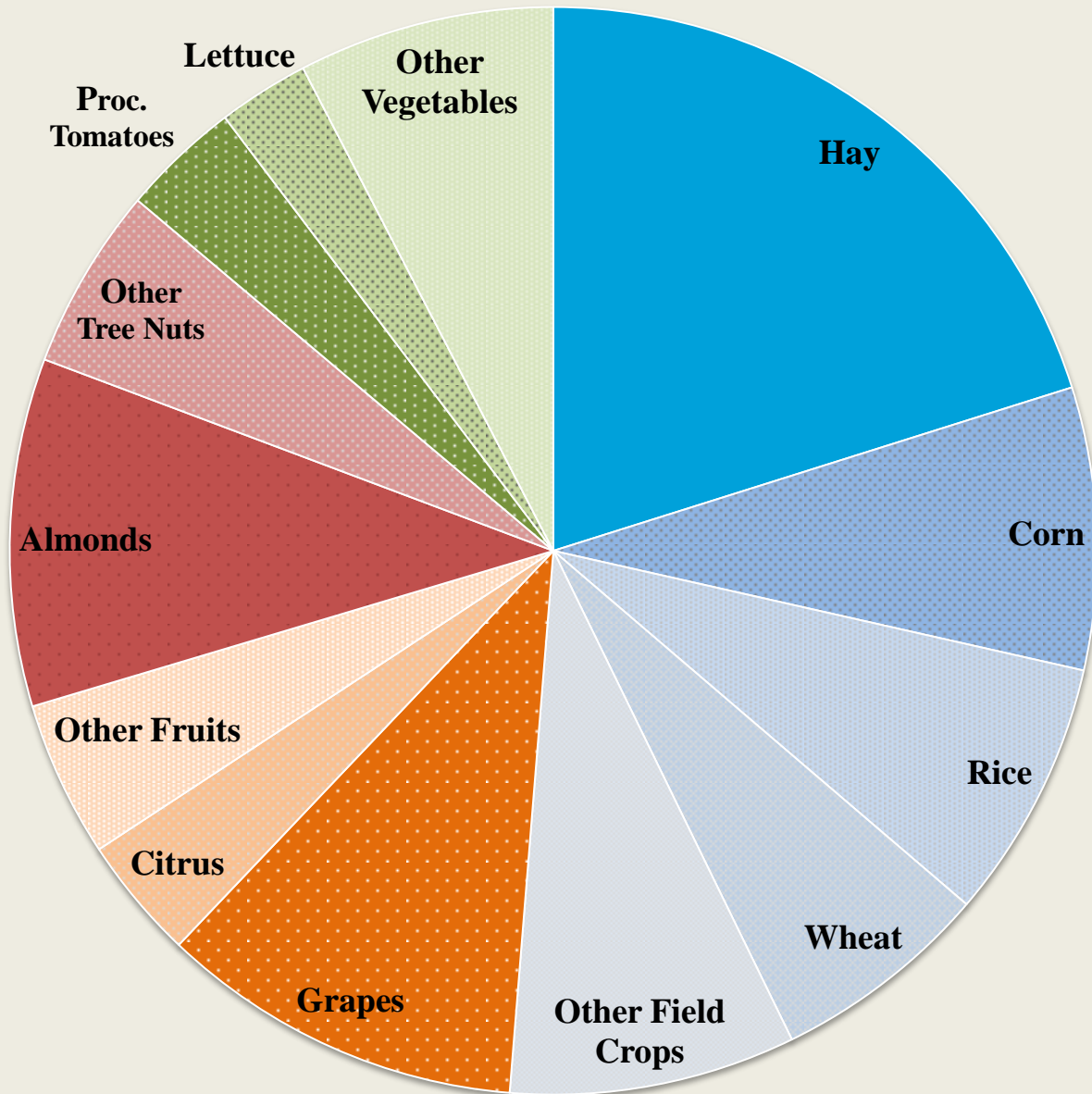
# Real Gross Domestic Product (GDP), with projections



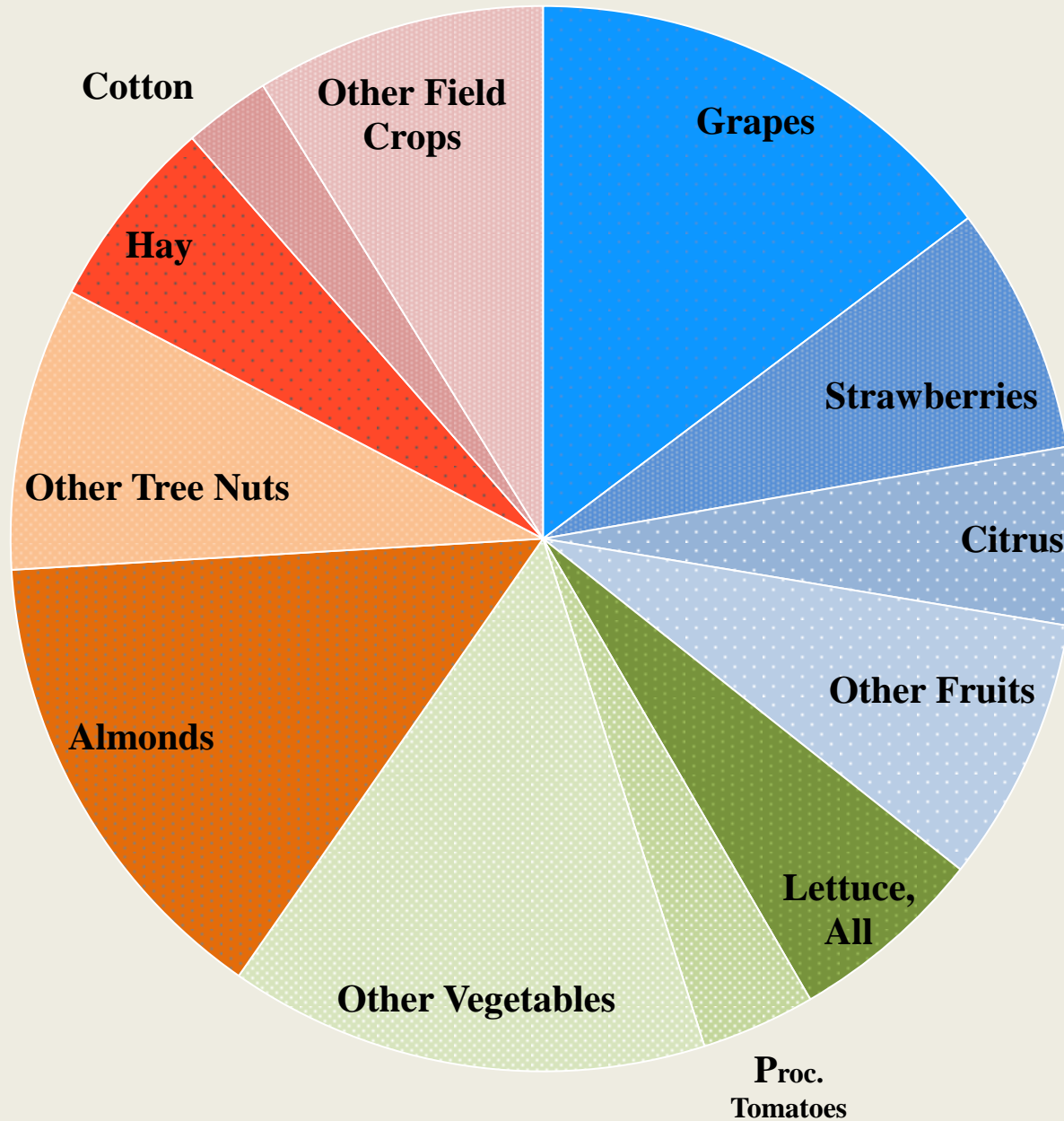
# **Global supply growth derives mainly from:**

- Opening new land area for crop and livestock production,**
  - Additions to availability of irrigation water**
  - Increased availability (lower prices) of inputs such as improved seed, fertilizer, pesticides and equipment**
  - Improvements in management on farms as weaker farmers leave and better farmers manage larger farms**
  - Improved handling and reduced losses off the farm**
  - New and newly adapted and adopted technology and practices**
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- All of these continue to contribute, but, as usual, concerns arise about how much more can be expected**
  - Particular concern about R&D contributions and willingness to allow adoption of new technologies and allow development of additional resources.**

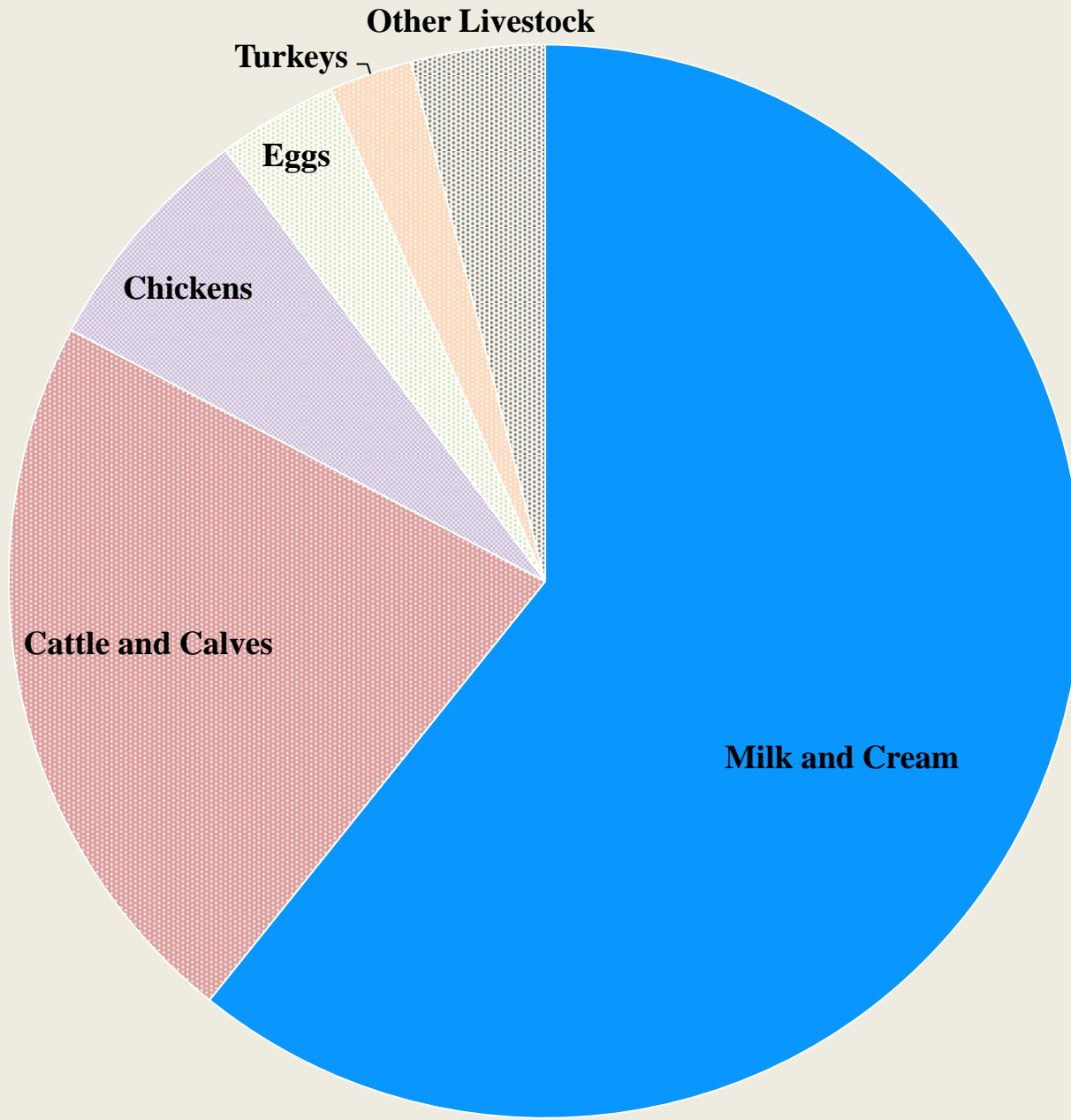
**Figure 1. Acreage of California Crops, 2010-2012  
(average total crop acres = 7,348 thousand acres)**



**Figure 2. Value of California Crops, 2010-2012**  
(average total crop value = \$ 26 Billion)

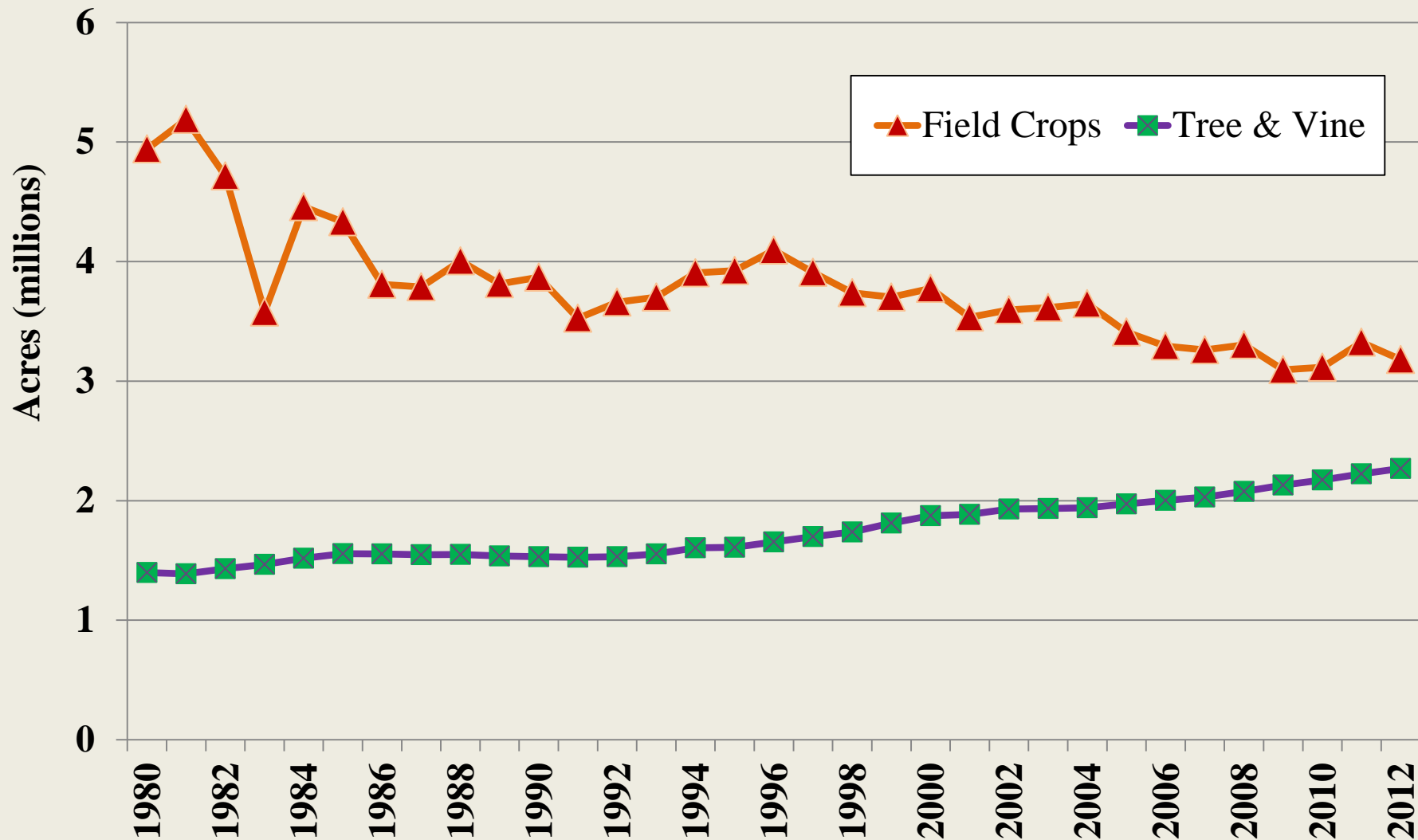


**Figure 3. Value of California Livestock, Poultry and Dairy  
(2009-2011 average total livestock and dairy value = \$10 Billion)**

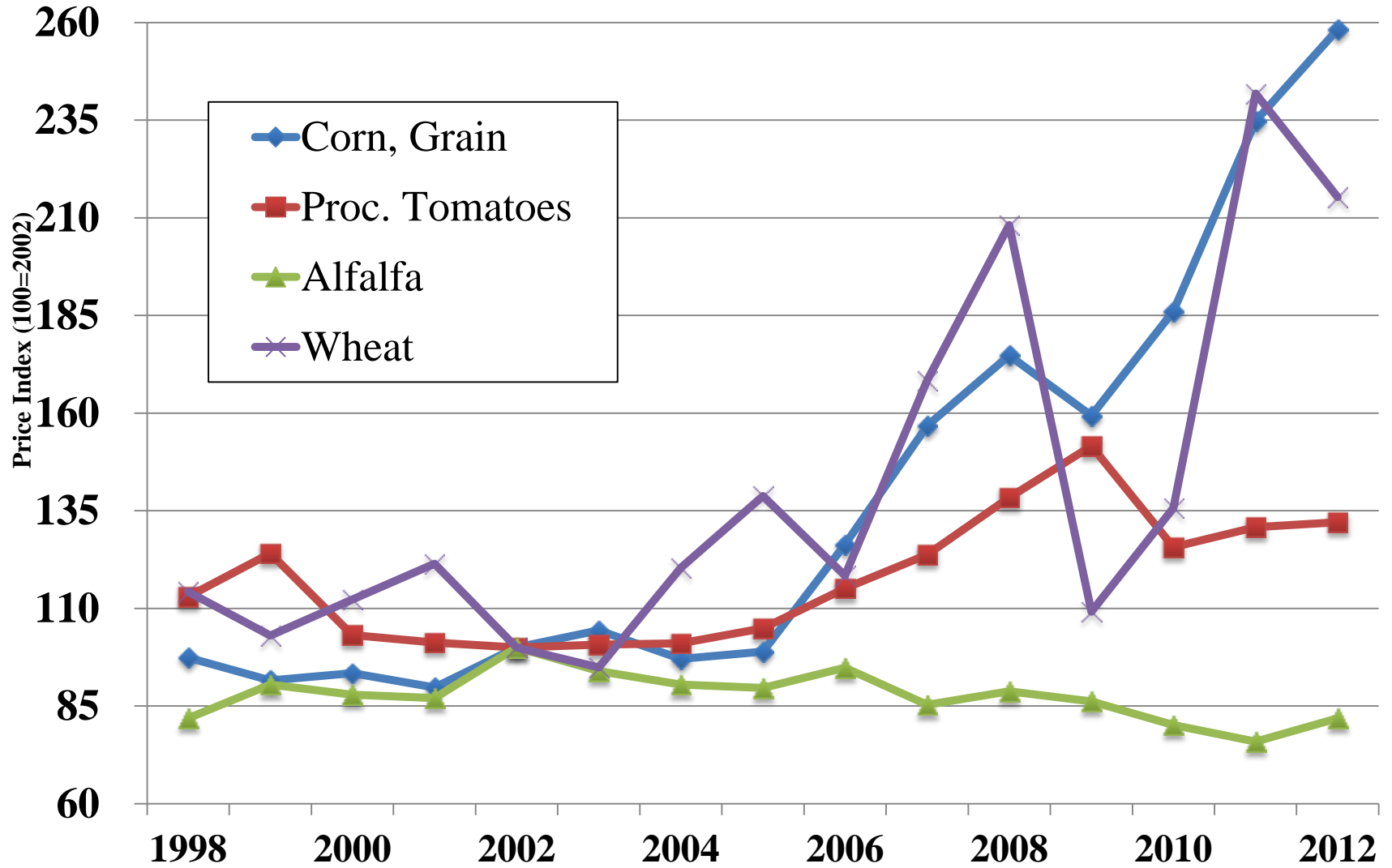




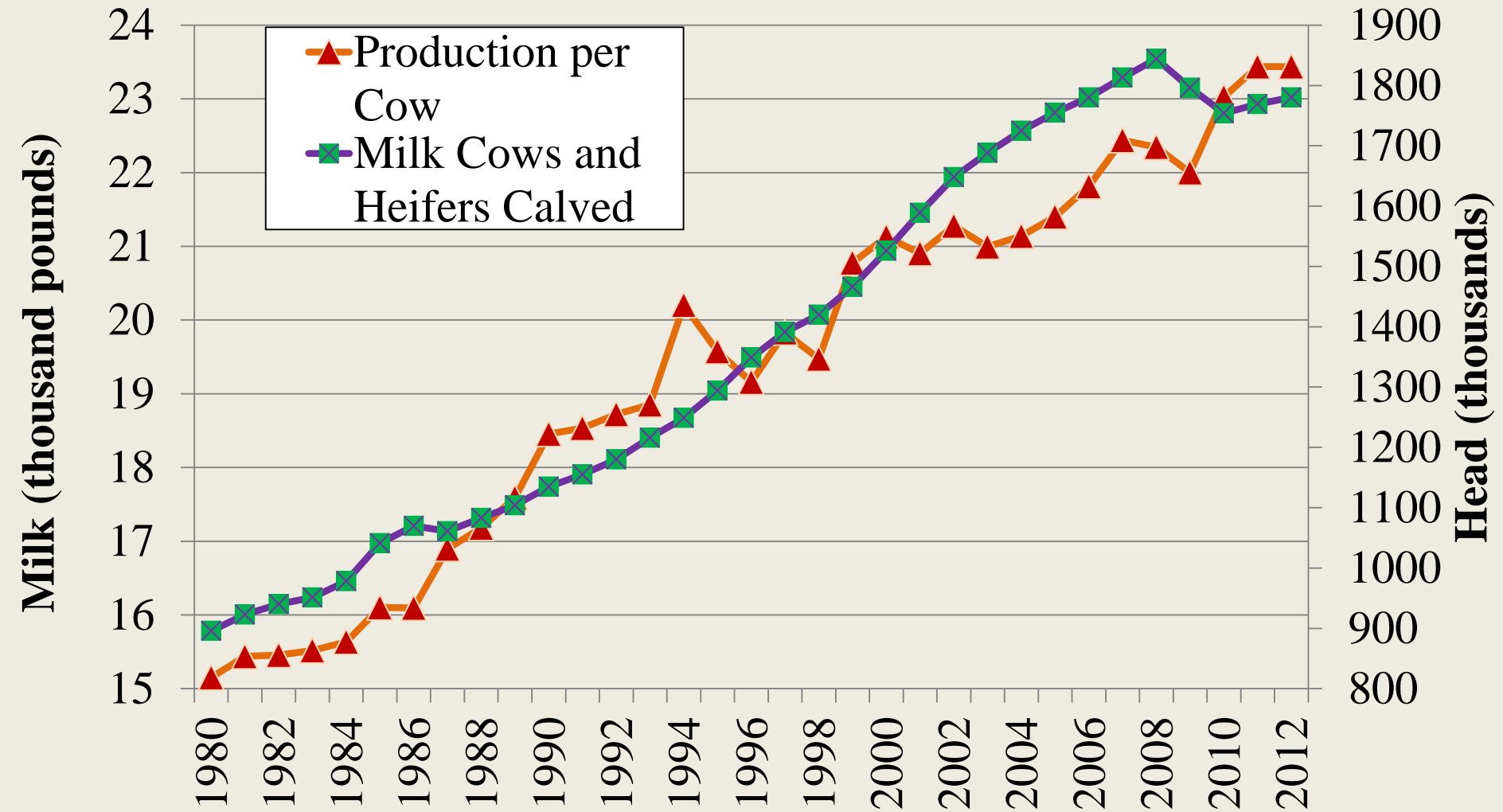
# Annual Acreage of California Tree & Vine and Field Crops plus Processing Tomatoes, 1980-2012



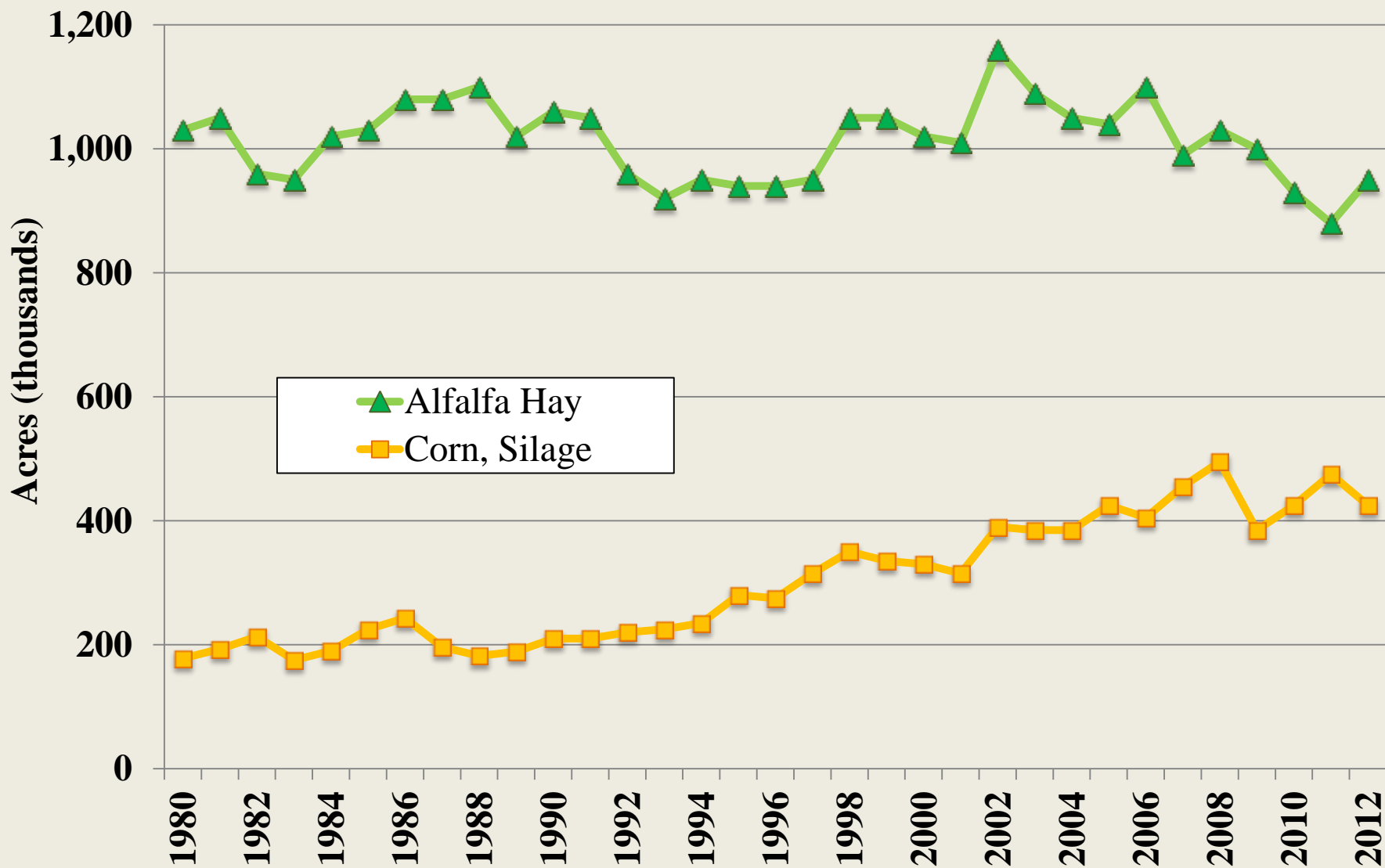
# California Crops Price Index, 1998-2012



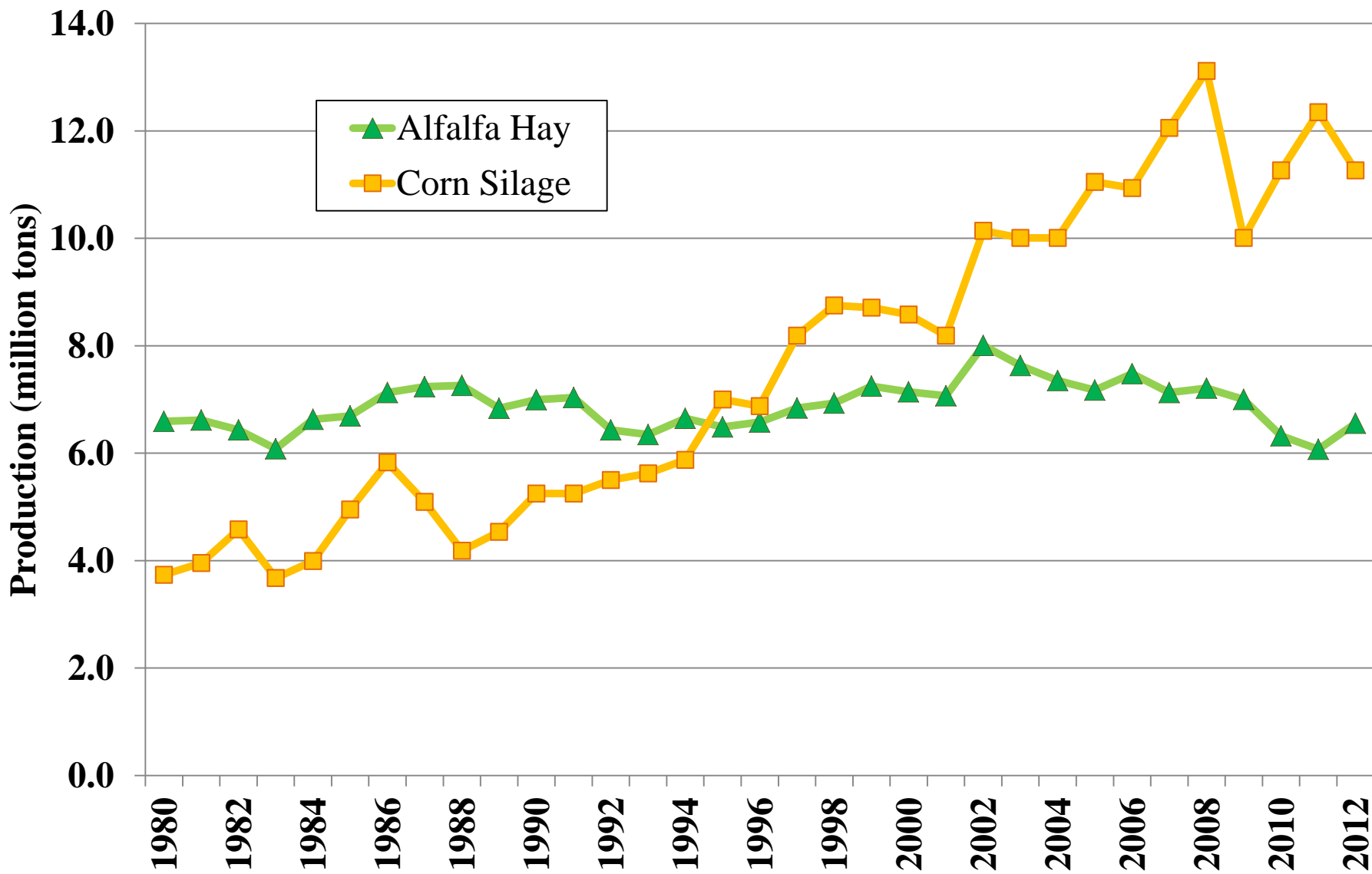
# Number of California Milk Cows and Milk Production per Cow, 1980-2012



# Annual Acreage of California Alfalfa Hay and Corn Silage, 1980-2012



# Annual Production of Alfalfa Hay and Corn Silage, 1980-2012



## **Actual and *Prospective* Planted acres of Grains and Other Field Crops in California**

<b>Crops</b>	<b>2013</b>	<b>% Change 2011 to 2012</b>	<b>% Change 2012 to 2013</b>
	<b>1,000 acres</b>		
<b>Corn*</b>	560	-3.2	-8.2
<b>Oats and Barley*</b>	290	16.7	-17.1
<b>Wheat*</b>	700	-5.1	-6.7
<b>Hay</b>	1,450	9.9	-6.5
<b>Rice</b>	550	-4.1	-2
<b>Sunflower</b>	53	15.5	4.3
<b>Cotton</b>	280	-19.5	-23.7

**\*Includes acres used for hay and silage**

## Ten-year USDA National Baseline Projections, Field Crops

<b>Crops</b>	<b>2012</b>	<b>2013</b>	<b>2022</b>	<b>(2020-22/ 2011-13)</b>
<b>Corn</b> , Acres (mil.)	96.9	96.0	92	0.96
Production (bil. bu.)	10.7	14.4	15.26	1.20
Price (\$/bu.)	7.60	5.40	4.85	0.74
<b>Wheat</b> , Acres (mil.)	55.7	57.5	50	0.90
Production (bil. bu.)	2.27	2.19	2.08	0.96
Price (\$/bu.)	8.10	7.20	6.2	0.81
<b>Rice</b> , Acres (mil.)	2.70	2.70	3.2	1.19
Production (mil. cwt)	199	192	250.3	1.29
Price (\$/cwt)	15.0	15.2	16.9	1.12

## **Ten-year USDA National Baseline Projections, Beef, Poultry and Dairy**

<b>Commodity</b>	<b>2012</b>	<b>2013</b>	<b>2022</b>	<b>(2020-22)/ (2011-13)</b>
<b>Beef</b> , Production (bil. lbs.)	25.6	24.5	26.3	1.03
Price (\$/cwt)	121	127	129	1.07
<b>Broiler</b> , Production (bil. lbs.)	36.5	36.1	41.7	1.13
Price (cents/lbs.)	51.0	52.9	62.7	1.23
<b>Eggs</b> , Production (bil.dozens)	7.69	7.61	8.10	1.05
Price (\$/dozen)	1.00	0.99	1.20	1.20
<b>Milk</b> , Cows (millions)	9.23	9.13	8.91	0.97
Milk per Cow (thou. lbs.)	21.6	21.9	25.8	1.17
Price (\$/cwt)	18.6	19.6	20.8	1.06



## Ten-year USDA National Baseline Projections, Fruits

Crops	2013	2022	(2020-22)/ (2011-13)
<b>Citrus, fresh and for proc., price index reflects weighted avg.</b>			
Production (bil. lbs.)	23.1	21.1	0.91
Exports (\$ bil.)	1.4	1.5	1.29
Imports (\$ mil.)	604	850	1.49
Price Index	113.4	137.4	1.24
<b>Non-citrus, fresh and proc., price index reflects weighted avg.</b>			
Production (bil. lbs.)	41.0	42.9	1.03
Exports (\$ bil.)	3.9	5.3	1.4
Imports (\$ bil.)	7.3	10.6	1.46
Price Index	96.5	109.0	1.13
<b>Wine</b>			
Exports (\$ bil.)	1.3	1.9	1.41
Imports (\$ bil.)	5.4	8.1	1.53

## **Ten-year USDA National Baseline Projections, Tree Nuts and Vegetables**

<b>Crops</b>	<b>2013</b>	<b>2022</b>	<b>(2020-22)/ (2011-13)</b>
<b>Tree Nuts, main tree nuts, price index reflects a weighted avg.</b>			
Production (bil. lbs.)	5.4	6.5	1.20
Exports (\$ bil.)	7.0	10.0	1.59
Imports (\$ bil.)	2.0	3.1	1.61
Price Index	138.9	145.2	1.06
<b>Vegetables, fresh and for proc., excluding potatoes and pulses</b>			
Production (bil. lbs.)	83.1	87.9	1.08
Exports (\$ bil.)	6.2	8.1	1.31
Imports (\$ bil.)	10.8	15.8	1.49

# Summary Discussion Prospects for Dairy are Central

- 1) The dairy industry is large and important for GHG emissions**
- 2) Dairy prospects determine prospects for silage (and to some degree alfalfa) and therefore crop mix using land and water**
- 3) The dairy industry uses almost all silage and much of the alfalfa in the Central Valley (about 1.5 million acres), so if dairy demand changes it affect land use for all crops**
- 4) Current dairy prospects are not favorable...costs of production and processing are no longer low relative to other places and California no longer has a technology edge**
- 5) Only about 15% of output is sold as fluid locally, the rest hinges on competition with other regions that have adopted “California” systems.**
- 6) California dairy must innovate to compete effectively**
- 7) Moreover, housing two million cows near several million people raises further complications that add to costs**

## **Summary Discussion, Crops**

- 1) There is no reason to expect an end to the long-term shift away from grain and cotton towards trees and vines**
- 2) California rice, grown mostly on land not suited for other crops, has distinct markets, types and quality.**
- 3) Tree nuts are moderate users of water and labor. Exports and domestic demand can still grow from a small share of consumer budget as incomes grow. Technical change continues to improve yields and lower costs.**
- 4) Wineries are again encouraging grape planting (Coastal and in the Central Valley). Long term demand prospects support more acreage.**
- 5) Processing tomatoes remain a successful rotation crop. Drip irrigation lowers water use, raises yields and lowers GHG emissions. Global demand continues to grow and European costs are high.**
- 6) The other important commodities for land use (cattle and calves) or value (ornamentals & fresh produce) are much less important for Greenhouse gas mitigation.**

**Thank you. [www.aic.ucdavis.edu](http://www.aic.ucdavis.edu)**

