

# HAY EXPORTS AND DYNAMICS OF THE WESTERN HAY MARKET

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## ABSTRACT

Exports have become a prominent component of western hay markets in recent years. Value of US hay exports was \$1.2 billion in 2012, up from \$286 million in 1998. While Japan is the largest purchaser of US hay, China, The United Arab Emirates (UAE) and Korea have recently dramatically increased their demand for US hay. In 2008 these three countries purchased about \$75 million in US hay products. This increased seven fold to \$540 million by 2012. While in 2008, 17% of all US exports were to these three countries, by 2012, 49 percent of total US hay exports were destined for Chinese, UAE, and Korean ports. Hay exports consist of about half alfalfa and half grasses, and are almost entirely the purview of the 7 western US states (AZ, CA, OR, WA, NV, UT, ID). Currently, the equivalent of 12% of the alfalfa and 30% of grassy hays produced in the seven western states are exported (in 2007, only 5% of the alfalfa in the seven states was exported). Several major drivers are implicated – strong growth in dairy product demand in Asian countries and the Middle East, generally high quality and reliability of western hays, inexpensive containerized shipping, and production limitations, including water supplies and logistics in destination countries. Exports have transitioned from a footnote to a major factor for western hay markets, and are likely to become more important in the future.

## INTRODUCTION

While many crops (corn, wheat, soybeans, almonds and citrus) have long been traded on the world market, forages have mostly been fed within a few miles of the animals they nourish. Long-distance transport of hay from prime growing areas to dairy or livestock regions has been



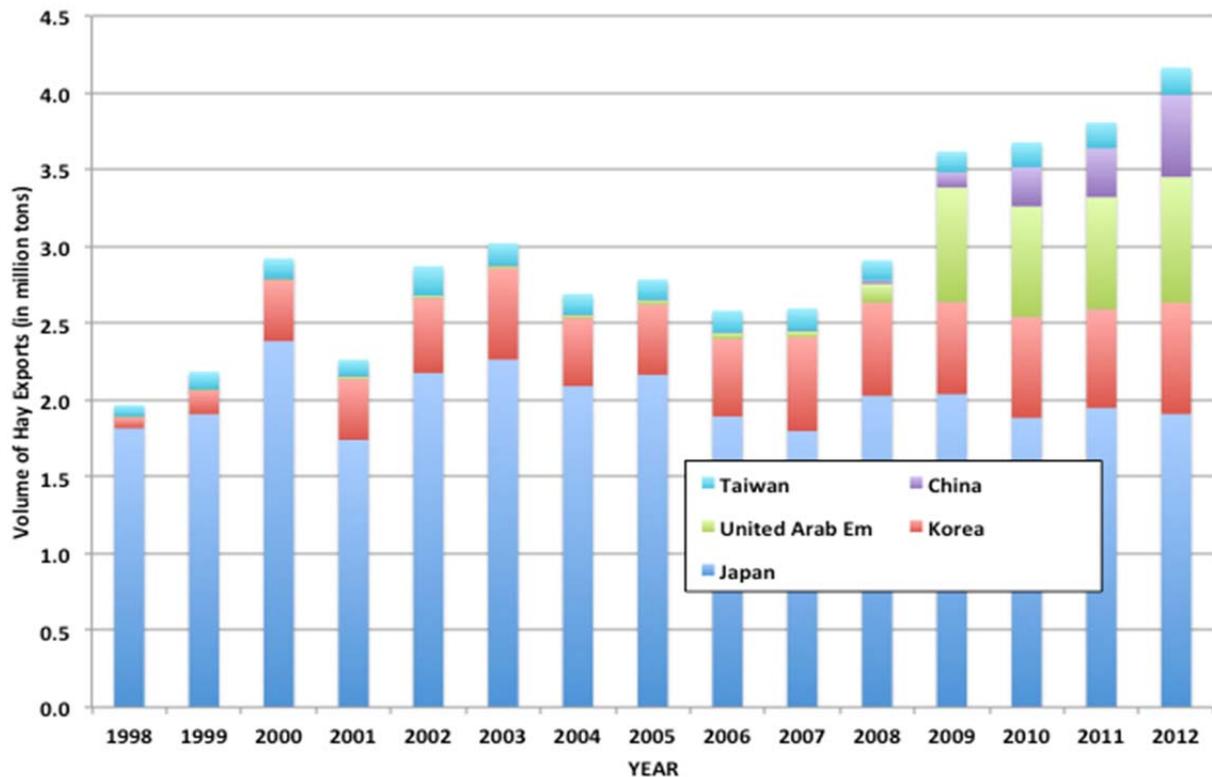
**Figure 1.** Hay has gone through a long transition from a crop fed mostly on-farm, to being trucked hundreds of miles, to being shipped internationally. Currently, 12.5% of western state's alfalfa and >30% of grass hay is exported, a number that has risen significantly since 2007.

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common for many decades in western states. Long distance delivery has morphed in recent years to exports overseas. The advent of inexpensive containerized shipping, technology for compression of hay and growing world demand has changed the equation, at least for the Western United States. This phenomenon creates new markets for western hay growers and new business opportunities, but also causes some concern by western livestock hay buyers.

### HOW MUCH HAY IS NOW EXPORTED?

In 2012 total hay exports exceeded 4 million Metric tons (MT), approximately double what it was in 1998 (Figure 2 - note, to convert MT to short tons, multiply by 1.102). Currently, the equivalent of over 12% of the alfalfa and over 30% of grassy hays produced in the seven western states are exported.



**Figure 2.** Volume (Metric Tonnes) of US Hay Exports from Western Ports by Top 5 Destination Countries, 1998-2012. Over 99% of all hay exports are from western ports. Western ports include all ports in California, Oregon and Washington Source: US Dept. of Commerce.

Asia and Pacific Rim countries have been the primary destination for U.S. hay exports. Hay exports from the Western ports of California, Washington and Oregon account for about 99 percent of total annual U.S. hay exports, although hay exports are emerging from eastern ports.

**Table 1.** Comparison of 2012 and 2013 (First 9 Months Only) Alfalfa and All Hay Exports to Top Destination Countries from Western Ports<sup>1</sup>.

ALFALFA HAY						
	Value (\$ millions)		Percent Change	Volume (1,000 MT)		Percent Change
	2012	2013		2012	2013	
Japan	152	151	-.27	471	457	-3.0
UAE	99	119	21.4	390	503	29.0
China	73	128	74.6	268	419	56.3
Korea	35	43	23.2	129	135	4.6
Taiwan	17	17	4.2	72	58	-19.4
Total Exports	403	474	17.5	1,448	1,624	12.2

ALL HAY						
	Value (\$millions)		Percent Change	Volume (1,000 MT)		Percent Change
	2012	2013		2012	2013	
Japan	435	419	-3.7	1,279	1,192	-6.8
UAE	128	160	25.4	470	632	34.4
China	103	168	63.2	360	558	55.0
Korea	139	138	-0.4	458	419	-8.5
Taiwan	30	34	12.5	118	119	0.8
Total Exports	869	942	8.4	2,817	2,988	6.1

<sup>1</sup> Western ports include those in California, Oregon and Washington (Long Beach, Oakland, Portland, and Seattle-Tacoma).

from southeastern hay production regions in recent years. Japan is the largest, most consistent buyer, purchasing an average of slightly less than 1.8 million MT annually from 1998 to 2012. Hay exports to Japan include a mix of alfalfa, timothy, sudangrass and kleingrass (Figure 2).

Table 2. Value of US Hay exports from 1998 through 2012 (data, US Dept. of Commerce)

	1998	2007	2012
	(millions of dollars)		
Alfalfa	\$134	\$201	\$561
Other Hay	\$130	\$343	\$662
Total	\$286	\$544	\$1,223

**Dramatic Increase over 5 Years.** Overall volume of U.S. hay exports have increased by over 64 percent since 2007. This increase is largely due to growth in two markets: United Arab Emirates and China (Figure 2). UAE purchased just over 743,000 MT in 2012, a 20-fold increase from 2007, when it purchased just 37,000 MT of US hay. China's imports increased 200 times from 2,400 MT in 2007 to just over 485,000 MT in 2012 (all figures from US Dept. of Commerce).

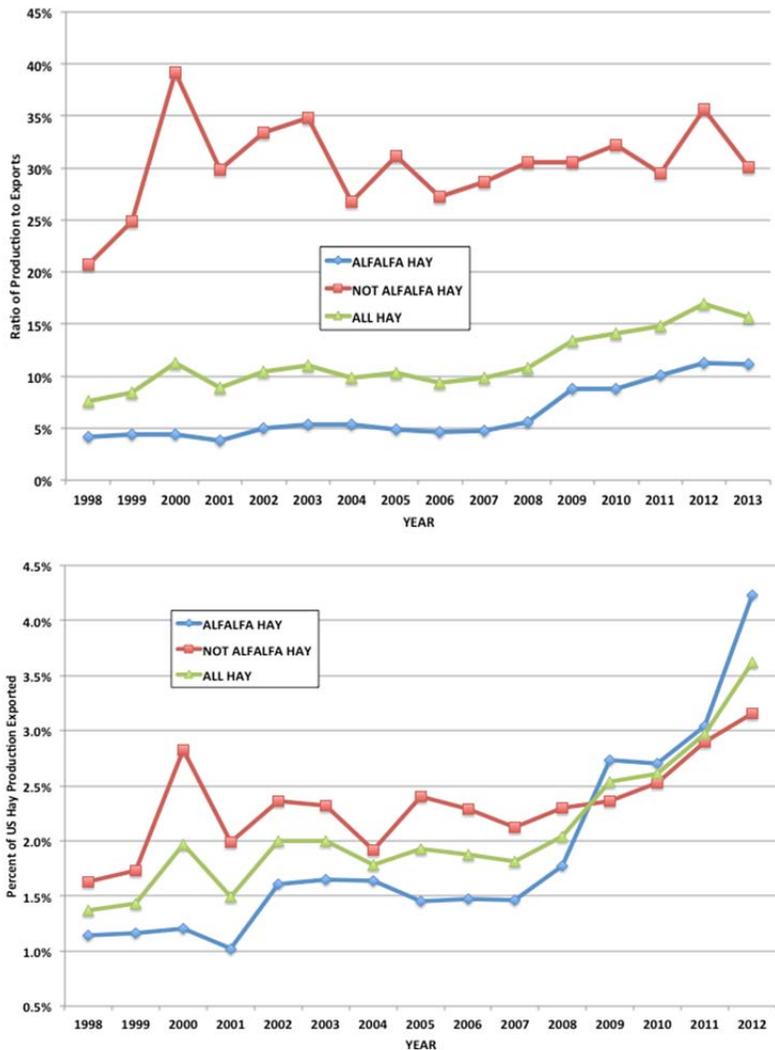
In 2013, exports to these two countries have intensified. If early 2013 data continues apace, total export volume to these two countries will be over 1.7 million MT (Table 1). As a reference, the

state of Nevada produced about 1.2 million MT and California 8.7 million MT in 2012. Total alfalfa exports increased 12% and total hay exports about 6% between 2012 and 2013 (first nine months), but exports to UAE and China increased 30-60% during that time (Table 1).

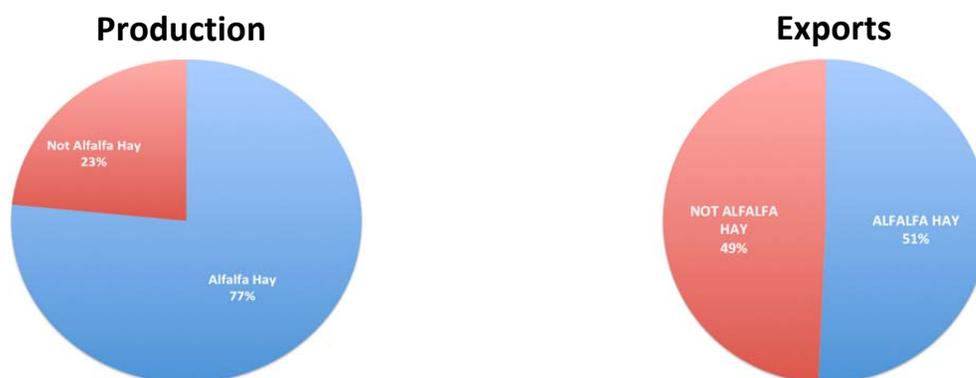
**Share of US Production Exported.** The share of US-produced alfalfa that is exported grew from 1.5% in 2007 to 4.3% in 2012 (Figure 3). The equivalent share of Western-grown alfalfa is much larger, at 12.5% in 2012, up from about 5% in 2007 (Figure 5). The lion’s share of exported hay is thought to be from the Western U.S. states (Arizona, California, Idaho, Nevada, Oregon, Utah and Washington). In specific regions, particularly the Imperial Valley of California, and the Columbia basin of Washington-Oregon, the percentage of alfalfa and grassy hays exported is thought to be over 50% of production.

Exports are even more important for grass hays. Over 30 % of western grass hay production is shipped overseas (Figure 4). Grass hays exported include cool-season grasses such as timothy and orchardgrass, and warm season grasses such as sudangrass, kleingrass, bermudagrass, and teff. While grass hays make up nearly half of exports, they are less than ¼ of western states’ production (Figure 6). In addition to hay, 194,000 MT of straw (e.g. wheat straw, rice straw) were exported in 2012 at a value of 25.1 million, mostly to the Korean peninsula.

**Value of US Hay exports.** Hay accounted for \$286 million in 1998. This rose to \$544 million in 2007, then more than doubled in the 2007-2012 period to \$1.2 billion (Table 2). It is anticipated that the 2013 figures will exceed this amount.



**Figure 3.** Ratio of Western Exports to Western Production shown as a Percentage (top) and percentage of US hay exported (bottom). Western states include Arizona, California, Idaho, Nevada, Oregon, Utah and Washington. Western ports include all ports in California, Oregon and Washington. Source: US Dept. of Commerce and USDA-NASS. .



**Figure 4.** Share of western states hay production and export by alfalfa and grass hay. Grassy hays (e.g. timothy, sudangrass, orchardgrass, kleingrass) are nearly half of the exports from western states (right), but they are less than ¼ of the production in this region (left). Data: US Dept. Comm., USDA-NASS

### WHAT ARE THE KEY DRIVERS?

**Demand is the Common Denominator.** The UAE, China, and Korea all have increasing demands for milk products and feed for local herds. In the UAE, the large herds of camels, horses, sheep, and goats is important, in addition to dairy and beef cattle, as demands for both milk and meat are increasing. Milk is also the key issue in China. Although China is not historically a milk-consuming culture, the per capita demand for milk products has been rising dramatically: from 4.2 kg in 1990 to 28 kg in 2012 (Figure 5). The Chinese government has encouraged more modern and larger dairy production units, to improve quality after a 2008 milk adulteration scandal. This has accompanied a significant rise in dairy cow numbers, up from about 2-5 million to 14 million today, according to government sources (Figure 5).

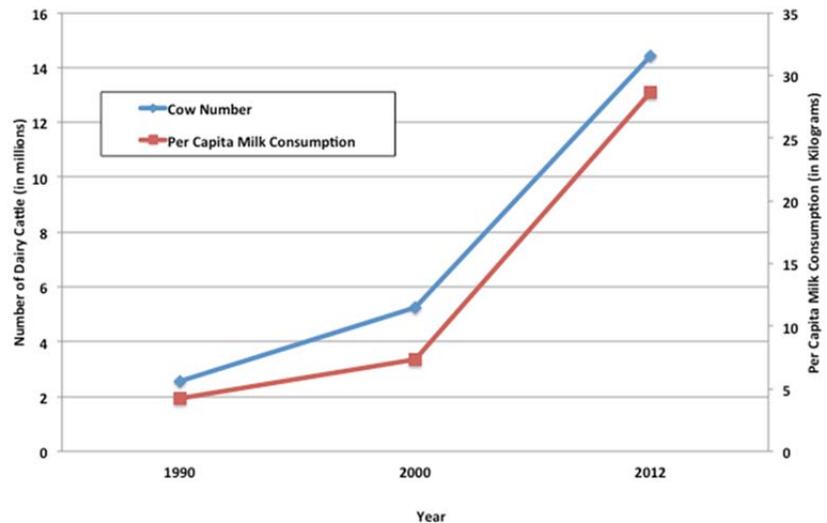
**Water in the Mideast.** The UAE government decided in 2008 to stop producing alfalfa hay in the kingdom, due to their increasingly scarce water resources. Given local herd dependence on forage, this created an immediate demand for imported hay. In that part of the world, pumped water largely originates from fossil sources, which will never be renewed in human history.

Knowledgeable sources expect a similar decision from the government of Saudi Arabia in the very near future. An abrupt decision to stop hay production in the kingdom would cause the rapid development of new hay markets much larger than that in the UAE, perhaps in the 2-4 million MT range. Parts of the world outside the western States (Mideast, North Africa, Europe, South America) may satisfy much of this demand. However, increasing demand for milk and beef, and the feed to sustain their supply, illustrates the importance of water to the future of food production, and the resulting globalization of the feed supply.

**China Dairy Growth.** Water is also a major limiting factor in China. However, the increase in dairy demand, increased cow numbers in China, and limitations in arable land near the cities where dairy cows are located are perhaps more important factors in the increased demand for high quality alfalfa imports.

The imbalance of trade with China and the US means that the price of ocean shipping to Asia is cheaper than over-land transport costs within China, or even within the US. (This factor does not apply to shipments to the Mideast). Further, summer rains make hay production difficult in China (as in much of the eastern United States), and infrastructure for hay baling, handling and transport is limited. Long distance transport from alfalfa-producing areas to dairies is also an important cost factor domestically, since ocean shipping is cheaper than overland shipping.

**Chinese Efforts to Improve Alfalfa.** Although the Chinese government is embarking on an ambitious program to improve domestic alfalfa production, most experts believe that their alfalfa production will not satisfy domestic demand for at least the next 5-15 years. Figure 5 highlights the 6-7 fold increase in milk demand and dairy cow numbers in just two decades.



**Figure 5.** Change in Chinese milk consumption and cow numbers, 1990-2012. Source: Chinese Grassland Association.

A key factor to watch will be milk prices in China. Although one cannot discount the role of government, prices are primarily a function of domestic dairy product demand. While China imports significant dried milk products, government policies and consumers favor production of fresh milk products near population centers for quality reasons. Farm milk prices have lately been about double those received by US dairy farmers, making it economically feasible for Chinese dairies to purchase hay delivered to the dairy at prices between \$350 and \$500 per ton.

### **WHAT ARE THE IMPLICATIONS HERE AT HOME?**

This is a more complex question. Western hay farmers have been happy to see the new markets open up, because new demand translates into firmer prices. Western dairy farmers, who face many pressures, are certainly not overjoyed at having to compete with foreign buyers for a limited supply of hay, especially with the cost-price squeeze which has been devastating for

western milk producers. Some critics have questioned the export of ‘water’ in the form of hay (see Culp and Glennon, Wall Street Journal ‘Shipping water to China Bale by Bale’ and response - Putnam, 2012). Although the substantial exports of almonds, -wheat and corn haven’t entailed a political/policy discussion on the evils of exporting ‘virtual water’ – it appears that the entry of hay into international markets has engendered such a discussion.

In many respects, hay crops are following (to a much more modest extent), the pathway of other crops (corn, soybeans, wheat, rice, citrus, and almonds), which have long been truly global commodities. Dairy exports themselves have also increased rapidly, so we may be exporting hay directly or hay in the form of milk powder or cheese. In 2012 dairy exports, valued at more than \$1.3 billion, were the #2 ranked export commodity (by value) from California.

### **WHAT ABOUT THE FUTURE OF HAY EXPORTS?**

While exports are not a dominant component of hay demand nationally, it is increasingly important in the West. The rapid increase in hay export importance reflects globalization of diets, and globalization of our food system generally. These data illustrate the historical progression of alfalfa and other hay from being grown and fed on-farm, to being traded locally, to long-distance transport, and then to a crop traded internationally. To some degree this is a logical extension of markets in the western US, where over 90% of the hay is marketed off the farm anyway. This is not true of the Midwest or East where most forage is fed on-farm.

Prognostication is a dangerous thing. However, the confluence of 1) Intense world demand for high quality milk and meat products, 2) Lack of buying country’s ability to produce their own forages, 3) generally high quality of Western-grown US hay, 4) US technology for hay handling, including efficient and inexpensive modes of ocean shipping that reduce costs of exports—all provide the circumstances that will further increase the importance of Western US hay exports in the future.

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