ENVISIONING THE FUTURE FOR ALFALFA & FORAGE CROPS IN THE WEST – Is It Really as Bad as it Looks?

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ABSTRACT

The cash-hay system which characterizes western alfalfa and dairy production has been challenged as never before. The dizzying heights of record high prices for alfalfa hay in 2007-08 were followed in 2008-09 by depressing lows that can only be characterized as a crash. This trend reveals economic vulnerabilities of the Western feedlot dairy-alfalfa hay model that were apparent in previous years, but not as severe as this year. Price swings, coupled with high cost pressure has caused negative cash flow and profitability for both hay operations and dairy producers. These severe price challenges are matched by resource, high costs and regulatory challenges, particularly water availability. Vulnerabilities are both economic and environmental sustainability of the western forage system should be examined with a view to long term improvements in water impacts, forage quality, and economic viability. Can we envision more sustainable western dairy-forage systems, both economically and environmentally?

Key Words: economics, historic trends, environmental issues, alfalfa production statistics

INTRODUCTION

The year 2009 is a year that many in agriculture would prefer to forget. The world-wide economic crash has reached its hands into the pockets of hay and dairy producers in a large way, causing economic havoc in ways not seen for many years. Highs and lows have occurred in somewhat more limited fashion over the past decades, but not to the same extremes as this year.

It might be said that if you don't like the news or the weather in the short-term, you should learn to think more long term. Thus it might be good to take a deep breath and try to envision longer-term trends to detect the fundamentals of forage production in Western States, as far as the major challenges, and opportunities that might exist for hay and forage producers.

SHORT TERM TRENDS

It's also been said that we shouldn't worry about the long-term, since in the long term, we'll all be dead. True enough, but it's also true that businesses and enterprises can surely die in the short run! Short-term losses can surely be the death-knell for businesses or individuals, if they can't obtain the lifeline of financing during short-term losses, or have viable strategies for survival and recovery. What have these short-term trends been for alfalfa and dairy producers?

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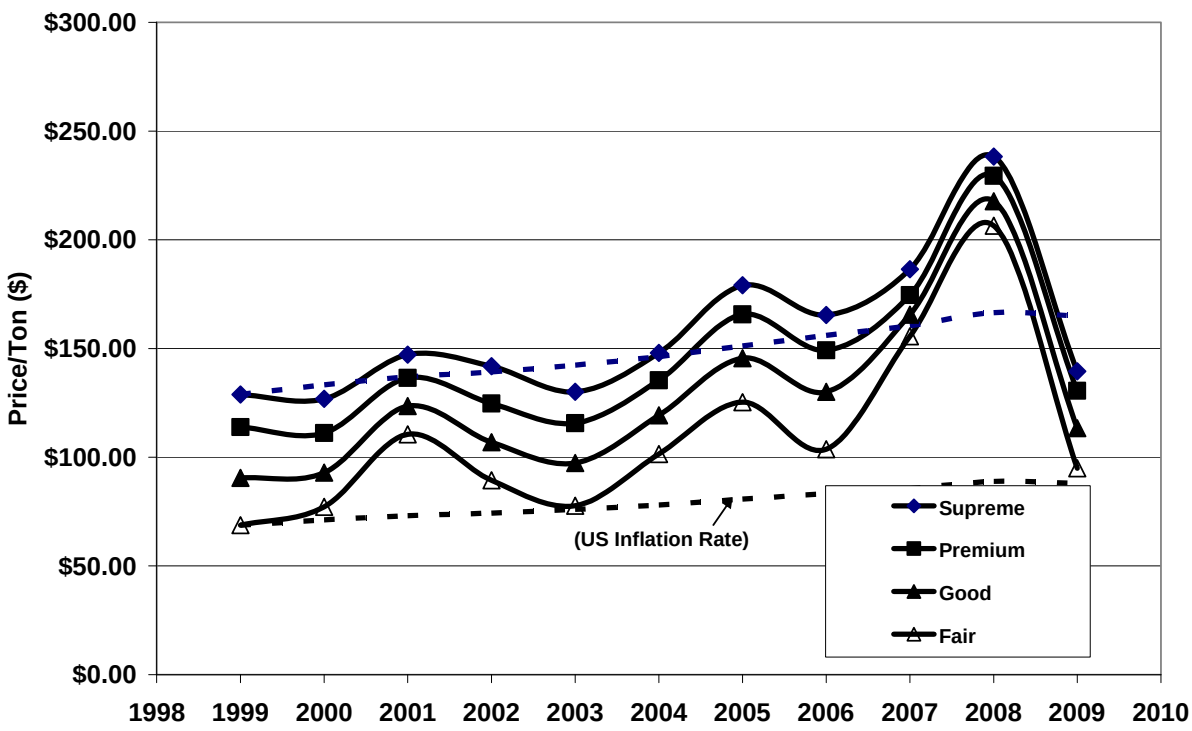

Figure 1. Changes in average yearly California hay price, 1999 through 2008, as affected by hay quality category. Dotted line represents average US inflation rate. Note spread due to quality changed in 2007 and 2008.

What are these short-term trends? The price situation for 2007-2008 and 2009 is a study in contrasts (Figure 1). In early 2007, Rick Staas of the San Joaquin Haygrowers commented: 'We think we might break the $200/ton hay price this year for the first time'. By late 2007 and 2008, the price had far exceeded this amount, rising to over $260/ton in some of the key dairy areas of Central California. The production years 2007 and 2008 saw absolutely unheard-of high prices, a seller's market. But how soon the tables turned! During a period which can only be thought of as a 'crash' in late 2008, prices fell precipitously! However, it could hardly be described as switching to a buyer's market, since so few were buying. Dairies were loosing money and just couldn't afford hay. There were huge reductions in price of hay during this period, often of more than $100/ton. This situation has continued through the summer and fall of 2009, with a slight uptick towards the end of this year, as the demand (especially for high quality hay) has been slightly improving. However, there are still substantial carryovers from 2009 production.

Quality Effects on Price. The price premium between high and low quality categories is typically less (both as a percentage and an absolute number) in high price years vs. low price years (Figure 1). This was especially apparent in 2007 and 2008, when even lower quality hays fetched a good price. Growers modified their cutting schedules to favor high yields vs. quality during this time. What's interesting is that those differences did not return in 2008 – it remains to be seen whether it'll truly return to a 'buyer's market in the next several months. The lack of 'quality premium' in the low-price 2008 is striking. Alfalfa growers enjoy these high spikes in alfalfa hay prices, but they should be aware that these rises cause important changes in feed rations as dairies learn to replace alfalfa with cheaper feeds, particularly corn and small grain

forages and feed grains, changes that can be essentially permanent. This has long term negative effects on hay growers, since effective demand is reduced over time.

CAUSES AND EFFECTS

So what caused this phenomenal rise and sudden fall of hay prices? The only thing that could sustain such high prices of alfalfa hay in were record high milk prices in 2007 and 2008 (Figure 2). Although feed prices were high, milk prices were sufficiently high to allow dairy profitability and sustain demand. However, in mid-2008, demand virtually ceased when dairy prices suddenly nose-dived. Although horse, export and beef have some influence, domestic dairy demand for alfalfa is the fundamental driver for hay prices in most regions in the West. Thus it is not surprising that milk prices have such a large influence on hay prices, influencing 'effective demand'.

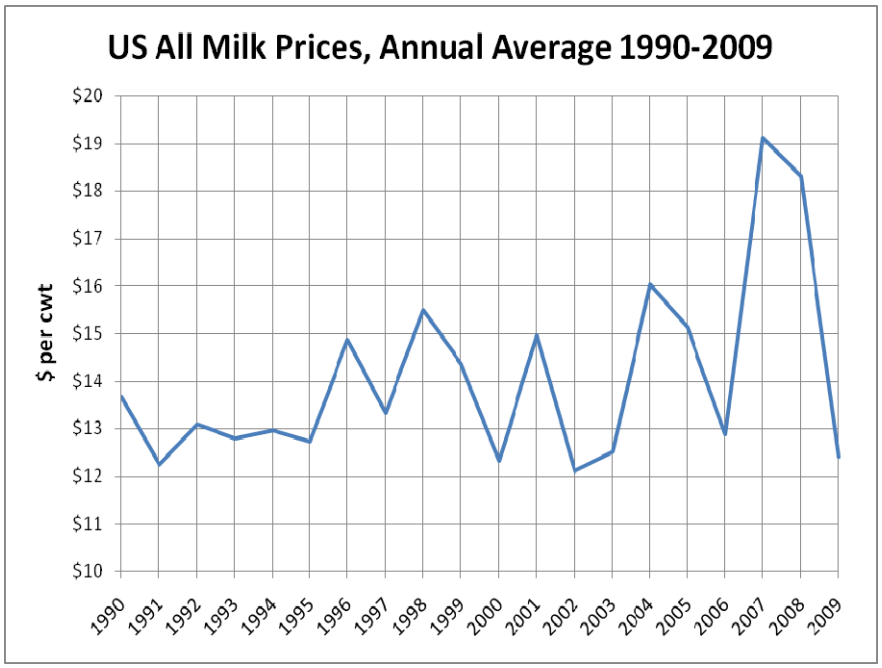

Figure 2. US Milk Prices 1990-2009

What caused such a large and dramatic increase in the price for milk? According to Bees Butler, dairy economist at UC Davis much of it can be boiled down to the foreign exchange rate of the US dollar. "The value of the dollar declined dramatically from 2002 through 2008, which made exports of milk viable—previously we were not as competitive in international markets. This was coupled with increased milk (mostly powder) demand from new consumers in China and India. Our exports rose from about 3-4% of production to nearly 15% very rapidly". Exports nearly more than tripled from US Dairy producers (Figure 3), who responded by adding

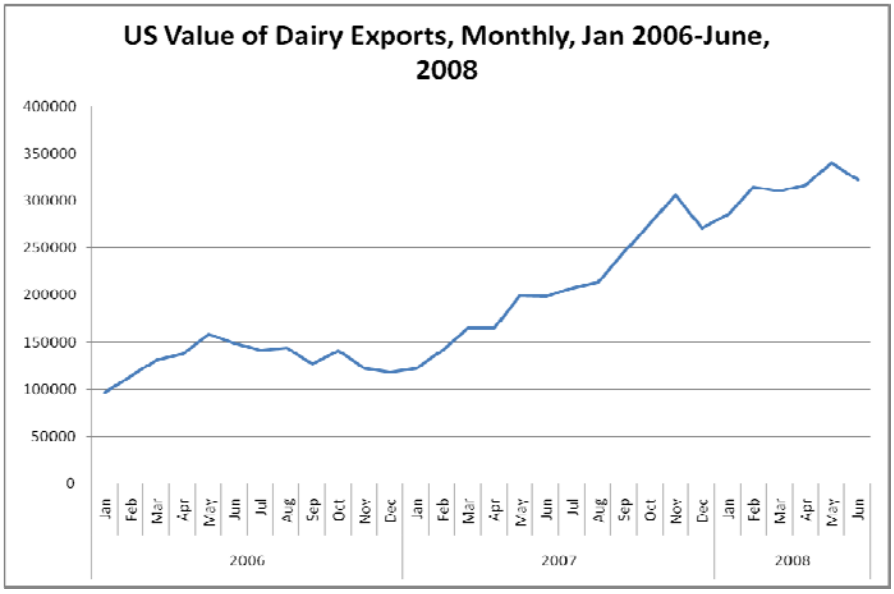

Figure 3. Export of dairy products, 2006-2008

cows and increasing production through this period. The increased demand was sufficient to move prices from a traditional $13-15 range to an unheard-of $18-20 range (per hundred weight). This occurred in spite of the fact that dairy production costs were rising very rapidly, including the price of alfalfa hay (Figure 4).

Commodity Prices. The high price of milk sustained demand for alfalfa hay (and other feedstocks) in spite of the fact that the cost of feeds had inflated badly from 2006 through 2008 (Fig. 4). Why were commodity prices increasing in this period from 2006-2008? We should remember that virtually ALL commodity prices (rice, wheat, corn, hay, precious metals, petroleum, fertilizers) were all increasing dramatically during this period, before the world-wide economic recession which hit in late 2008.

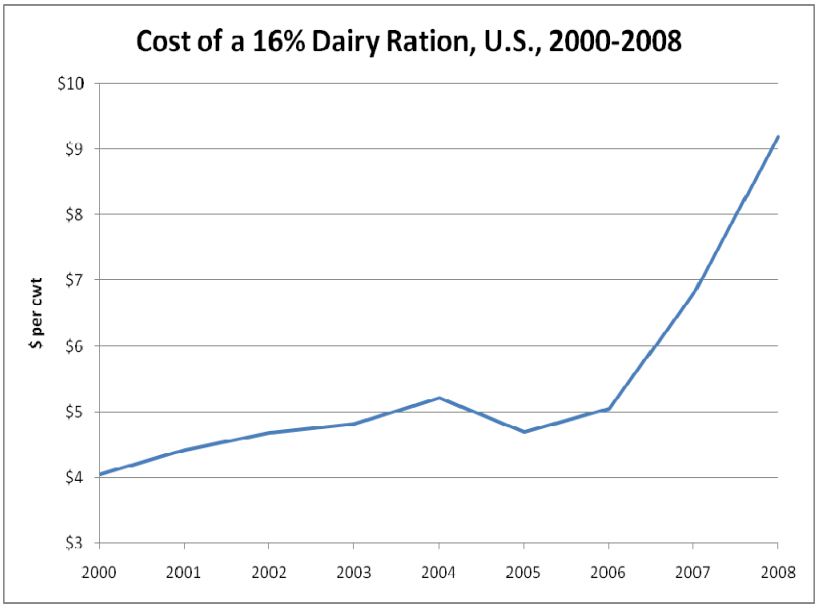

Figure 4. Costs of US dairy ration per hundredweight of milk (Bees Butler, UC Davis)

A full analysis of the world-wide economic crisis which emerged last year is obviously beyond the scope of this article. However several factors may have been important. There was a both real and perceived increased demand for commodities from the emerging economies of Brazil, India, and China, along with the demand for corn for biofuels in the US, which affects feed grains. There have been some (including this author) who speculated that we had fundamentally crossed over to a period where food and feed grains might be much more valuable due to world population and economic demand, rather than being chronically over-produced, which has been the case (at least in north America) for decades. However, another factor was the movement of large sums of investment cash worldwide from real estate to commodities after the real estate bubble which peaked in 2005-2006. Commodities proved to be attractive after real estate appeared to be souring. Large sums of excess cash from emerging economies like China, India, Brazil, added to the accumulation of investment dollars from petro-state(Middle East and Russia), besides that from Europe, US, and Japan has an effect on price beyond genuine supply and demand factors.

WHAT IS THE LONG TERM ENVIRONMENT IN WESTERN STATES?

However, as has been suggested in this article, when you don't like the short-term news, try thinking about the long-term. To think about the future, it's important to understand the past, and innovations which might effect the future.

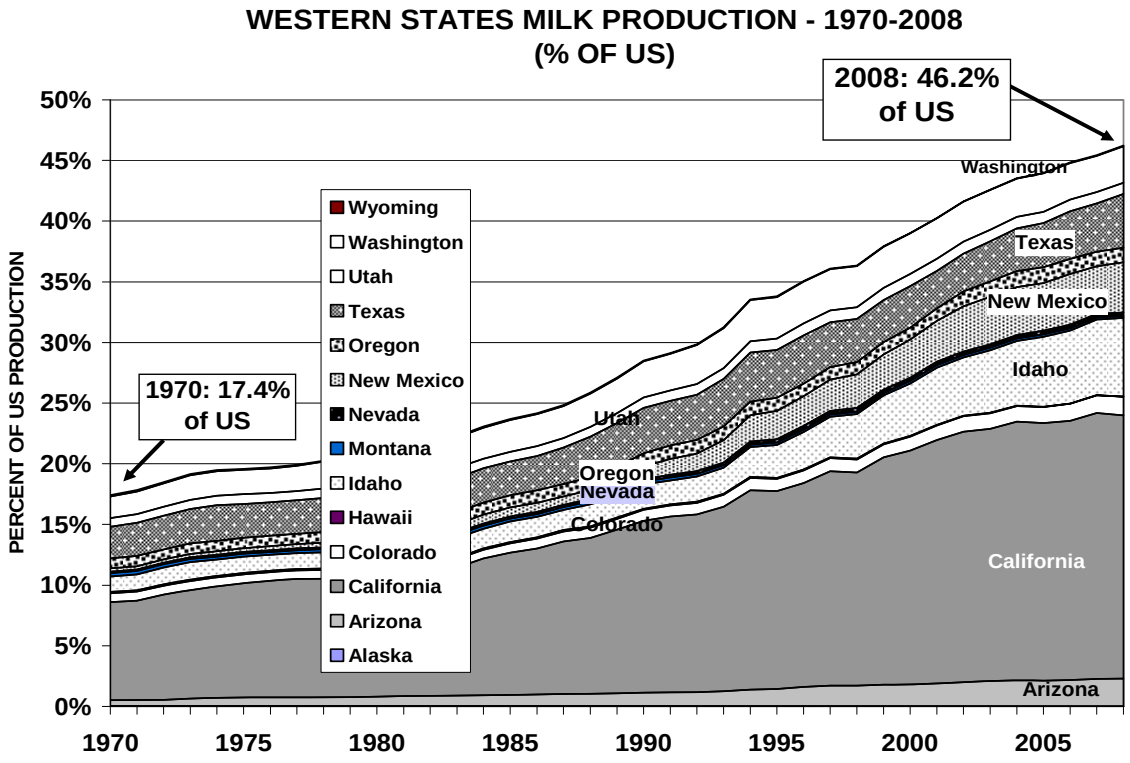

Figure 5. Changes in US milk production during the last 40 years. (USDA-NASS)

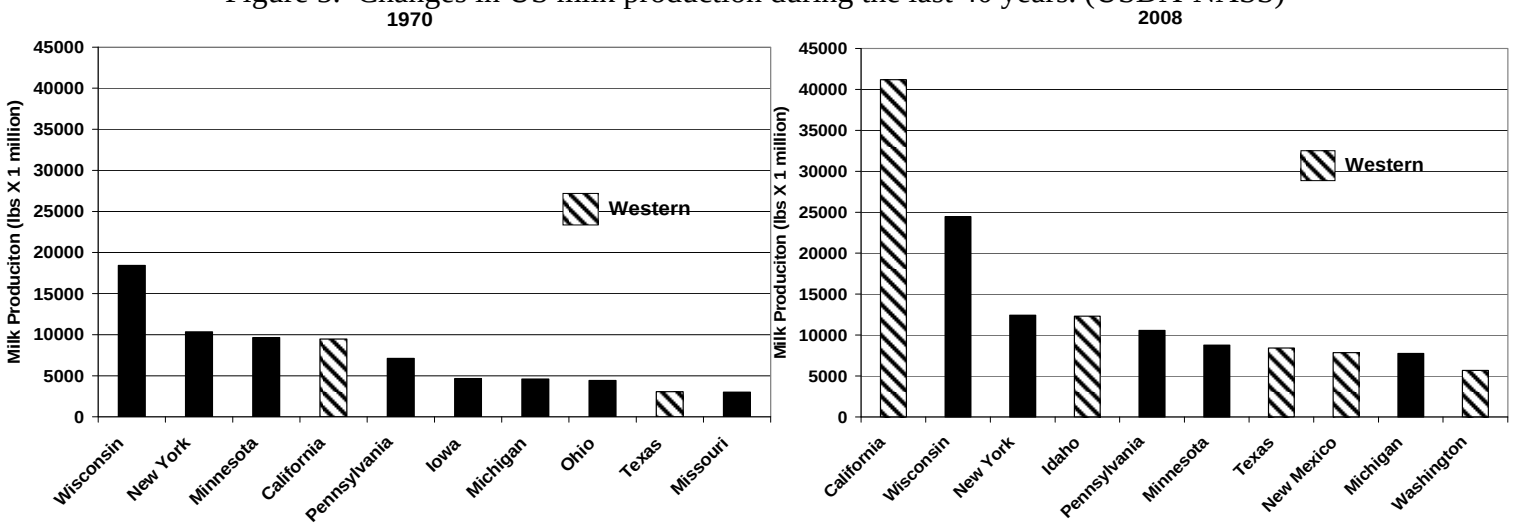

Figure 6. Top 10 Dairy States, 1970 and 2008

Alfalfa hay production has undergone a quiet transformation during the last decades. It has gone from a relatively low-value rotation and pasture crop grown largely to feed dairy cows on-farm, to a cash hay business, being grown and managed professionally, shipped long distances, even overseas, to multiple markets, with exacting demands on quality factors. It has risen from a 'Rodney Dangerfield' of crops ('don't get much respect'), to a crop which can effectively compete economically with a wide range of irrigated crops in the West, including potato, tomato and some specialty crops, as well as corn, grains, and oilseeds. California reached its first $1 billion crop about 6 years ago, and exceeded this amount in both 2007 and 2008.

Alfalfa is a major crop in all western states, from Colorado to California, Idaho to New Mexico. This has been the case for more than 100 years. However, more recent trends have seen a tremendous growth of population, as well as a growth in dairy production in these regions. This growth in dairying has been nothing short of phenomenal in almost all western states (with some

notable exceptions). Forty years ago, only California and Texas were among the top ten dairy states, whereas in 2008, Idaho, New Mexico and Washington joined the top ten list (Figure 5). While in 1970, western states accounted for only 17.4 percent of the nation's milk supply, currently the western states accounts for 46% of the nation's milk supply, with 22% coming from California alone. We should keep in mind that during this period, national milk cow numbers declined from 12 million dairy cows to 9.3 million dairy cows while western states added cows. Although increased population (of humans) in western states explains some of this growth, growth is driven by other factors. Factors which have contributed to western dairy growth are:

- Cost of Production, which proved to be lower than other regions
- Real Estate profits as dairies move from high value land to invest in expansion
- Availability of high quality alfalfa hay and productive corn silage in quantity
- Availability of plentiful by products ranging from citrus pulp to sugarbeet pumice
- A business-like approach to management including heavy culling rates and financing
- Generally reliable labor supply
- Professional nutritional support and genetic improvement of animals, infrastructure.
- Weather that favors high milk production conditions

Thus, western alfalfa producers have been producing a crop under the general condition of increasing demand from dairy cow numbers for more than a generation, at least in specific areas of this large western region. These dairy numbers are quite concentrated, though. The largest concentration of dairy cows in the West is in the southern part of the San Joaquin Valley, particularly Tulare County and surrounding counties, and there are similar concentrations in other regions, such as southern Idaho and Phoenix..

Has Alfalfa Kept Up? There is little question that this dynamic western dairy situation has had an impact on alfalfa hay producers and other forage producers. But has alfalfa production followed the trend of increased dairy production and cow numbers? While alfalfa production has gone up slightly in some western states since 1970, it has not nearly kept up with the rate of growth in dairy production (Figure 6). In fact, one could say 'nowhere close'.

For example, the Idaho and New Mexico dairy production was 800% and 2500% higher than the level in 1970, where growth in alfalfa production in these two states was only about 35-40% higher, respectively. In California, we produce about the same about of alfalfa hay that we did in 1970, but quadrupled milk production. This same trend can be seen in virtually all other western states. Although these eastern states have seen a net modest increase in milk production due to higher productivity per cow, it's not nearly the increase seen in milk productivity in the West – which has been driven both by cow numbers and productivity per cow. However, this same disconnect between dairy production and alfalfa hay production can be seen in eastern states as well as western states (Figure 6), with loss in relative alfalfa production.

How have dairies been able to sustain such increases without much increase in alfalfa production? Several key factors:

- Dramatic Increase in Corn and small grain Silage Production
- Increased use of by-products, particularly fermentation by-products and meals, and grains
- Reduction in the alfalfa fed to beef animals vs. dairy sector
- Improvement and demand for alfalfa quality factors which increases production per cow

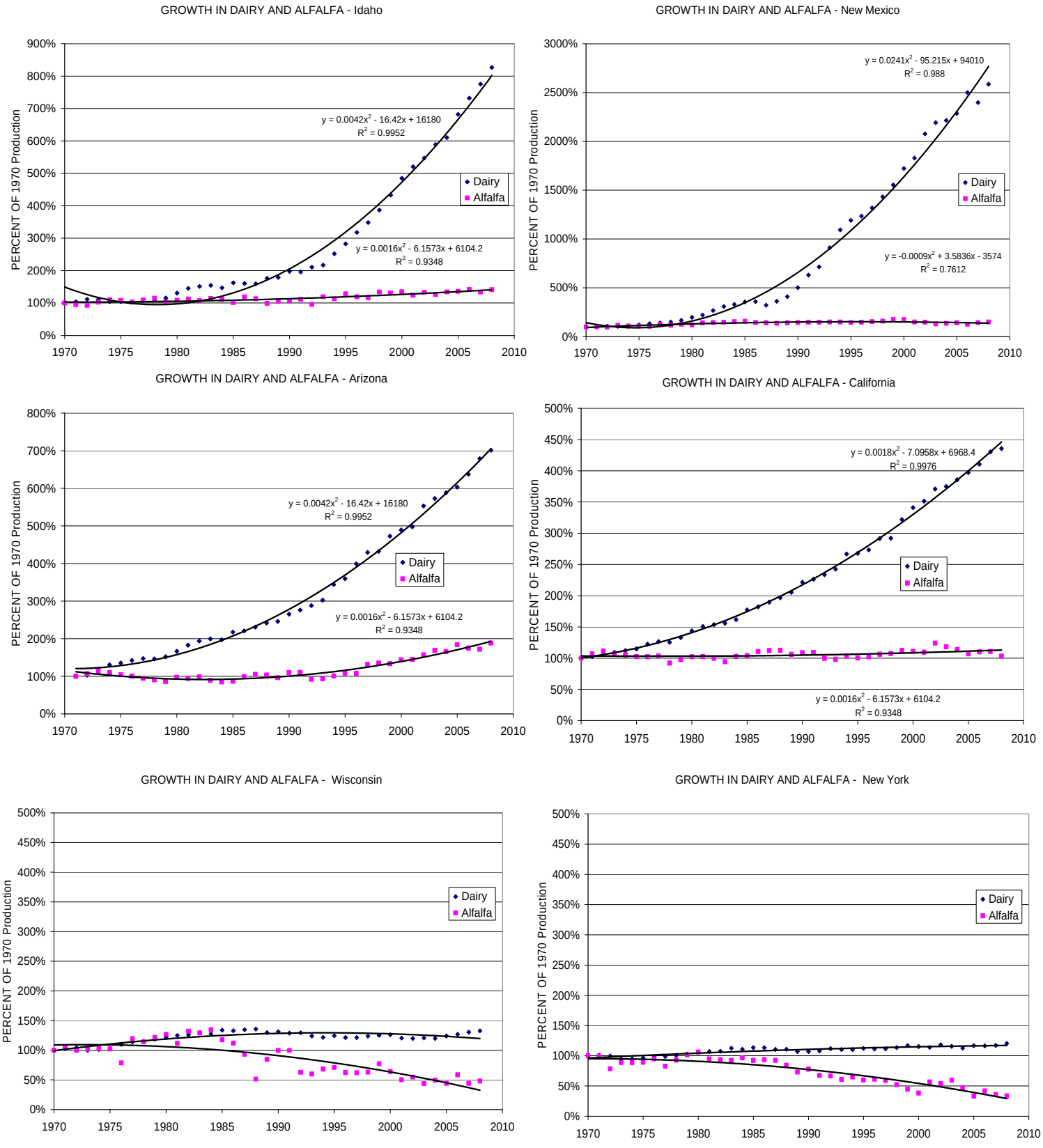

Figure 7. Changes in milk and dairy production, expressed as a % of 1970 for ID, NM, AZ, CA, NY, and WI. Note different range for Arizona, New Mexico and Idaho. These have had the highest relative growth rates (as a %) – CA has had the highest absolute growth rates (total production) over this period. In all of these dairy states, alfalfa production has not matched dairy increases.

These are important long-term trends. Alfalfa is competing in a fundamentally different market than it was 30 years ago. It's a process of intensification It seems appropriate to pay attention when the 'effective market share' changes so dramatically over a long period of time for a crop such as alfalfa. Have hay growers paid attention to this? What are the implications? What does this mean for the future of alfalfa and forage crops?

UNDERSTANDING LONG TERM CHALLENGES AND OPPORTUNITIES

So, is it really as bad as it looks? The short-term news has not been good. However, from a forage production point of view, western growers shouldn't be entirely dismayed by the long-term trends. Western alfalfa has been the key dairy feed in an 'expanding universe' of increased dairy cow numbers and forage demand in the major western dairy states for the past 30 years. The shift west and expansion of dairying in western states has been phenomenal. But the recent crisis in the dairy sector and loss in profitability does not bode well-these are two highly interdependent sectors: the dairy-forage system is a continuum, and so a crisis in one will obviously lead to a crisis in the other.

What are our lessons from this crisis? We will hear more during this meeting and from other speakers about the prospects for recovery of the dairy industry. There has been some modest improvement in dairy prices in recent months, and signs of life in the hay markets, particularly for higher quality hays. We should remember that this year's prices, even after the crash, are within the average inflation rates for the past 10 year period (Figure 1). But most in the industry expect recovery from the 08-09 crash to be painfully slow. Bees Butler, UC Dairy economist suggested that it would be 3-4 years for the dairy industry to adjust to the production excesses that arose from the sudden rise in exports and subsequent drop in demand.

This period of economic crises for alfalfa and forage crops is a good opportunity to think ahead. Here are a few comments on the implications and thoughts about the future:

Economics. If anyone needed convincing that we live in a global economy which behaves in a fashion that is not highly predictable, the events of the past 2 years should have convinced them. World events have large influences on domestic agricultural profitability. Imagine – the economics of a hay farm in Idaho, New Mexico or Nevada was effected by the willingness to purchase of yogurt by a mother in China, ice cream by a child in India, the relative value of the dollar vs. the Euro, and the ability of the New Zealanders to produce milk powder. If we think about this issue a little further – the need for reliable markets by hay growers and a reliable forage supply for dairy producers – at costs and prices that can be managed by both buyer and seller, it is apparent that there are few mechanisms which could assist producers to stabilize these ups and downs. Have alfalfa and dairy producers fully explored opportunities for forward contracting, futures markets, guarantees for price and quality, or other arrangements which could assist in controlling extreme price swings which have such devastating consequences on both industries? In short, the economic sustainability in the cash-hay system has been challenged as never before. There is a need to envision mechanisms to attempt to prevent dairy and hay farm bankruptcies and turmoil in this sector.

Water. There is little question that water is the key issue for all western alfalfa growers. This certainly limited acreage of alfalfa in 2007-2008. Cutbacks of water supply and uncertainty of water supply limit alfalfa production to a greater degree than any other production factor, limiting supplies and causing high prices. In normal years when prices spike, we typically see an expansion of acreage. That largely did not occur during this period in spite of the record-high prices, largely due to the western drought and lack of water, but also because of the high commodity prices for other crops, and shift of acreage to those crops. As western states face intensive battles over use of water for urban consumers and environmental impacts, alfalfa is often at the center due to its large water footprint. This crop has many positive features from a water use standpoint –it has the advantages of a perennial (early growth, deep roots, recovery of water from depth), high yields and high water use efficiency. However, no one can claim that our water management techniques are fully adequate to match a future of much greater water demand and conflict, higher regulations, and the need to produce forages under water-limited conditions. Longer-term, innovations and a more scientific approach to water management is badly needed to improve water used efficiency, yields, and to prevent off-site movement of water which may contain pesticides.

Yields. It is clear from long-term data that improvements in alfalfa yields have been modest at best during the past 40-year period. While dairy producers have improved production per cow more than 60% during this time, alfalfa yields have not really kept pace. This is one of the reasons for the results seen in Figure 6. Although part of this can be attributed to the increased emphasis on quality – changes in cutting schedules which favor quality over yield, most breeders would acknowledge the progress in alfalfa yields over the past 40 years have been measurable but quite modest. Certainly these gains have not kept pace with crops such as corn. Production methods and new varieties that improve yields, efficiency of water and resource use, and profitability are needed to sustain a profitable alfalfa sector. A key to this is to break the yield-quality tradeoff, so that growers can improve yields without sacrificing quality.

Forage Quality. The level of production of a modern dairy cow requires a much higher level of ration quality than was previously acceptable. But quality is not just a question of lowering fiber high crude protein, which is what markets typically recognize. Quality is a dynamic feature, and includes digestibility features, and protein efficiency factors. What are the unique factors which give alfalfa an 'edge' for animal producers? The presence of other forage crops as well as grains and byproducts changes what might be valued in alfalfa hay. After all, feeding at 5 or 10 lbs/day alfalfa with high by-products, silage and grains is likely to require very different aspects of quality than feeding 35 lbs/day of mostly alfalfa. Intensification of dairy production with higher milk yields in the future will require higher quality forages and a much higher level of understanding of quality by hay producers. Innovations by equipment companies, plant breeders, lab analysts, farmers and nutritionists to understand and improve quality are needed. We particularly methods to improve quality that do not result in reduced yields.

Biotechnology. The Roundup-Ready trait currently is undergoing USDA-BRS Environmental Impact review, and a decision is expected shortly. This will be a key test for alfalfa growers and the alfalfa industry. Whether the industry will be able to absorb a new technology, while successfully protecting a minority of growers (mostly export and organic) who do not wish to adapt the technology remains to be seen. This is a technological issue, but also a social and

'industry' issue, since it involves human behavior and cooperation. But the stakes are high. Opportunities though biotechnology for alfalfa varieties that improve milk production efficiencies, improve yields, allow production under saline conditions, can be produced with limited water supplies, and protect the crop from pests are all possible with these technologies. We have fundamentally entered into a world of biotechnology, as surely as we have seen the development of the industrial revolution several generations ago, and the information age in our lifetimes. Alfalfa is the key forage which is likely to benefit from biotechnology, along with biofuels. However, the issues of public acceptance, environmental safety and market impacts are not trivial. This creates tremendous opportunities as well as risks. We need to understand the economic, environmental, and health risks of these technologies, as well as their potential benefits. However, there is little doubt that that biotechnology has the potential to have large impacts on alfalfa profitability and effectiveness in the future

Climate Change and Fossil-Fuel Carbon Impact. Questions about the carbon footprint of agriculture, as well as the potential for carbon sequestration and carbon trading have barely been broached with crops such as alfalfa. Alfalfa is the third or fourth largest crop in the United States. What is the net carbon cycling and fossil fuel footprint of 21 million acres of alfalfa in the US? Alfalfa has a potentially large positive energy benefit due to biological nitrogen fixation, which annually conserves energy since it replaces N fertilizers for cereal grains. These policy discussions are important trends that could have impacts on growers in the future. Many of the important commodities are rapidly moving to try to understand the implications and potential contributions of agriculture to carbon sequestration, carbon cycling, and opportunities for carbon credits. Has alfalfa done the same?

Environmental Health, Regulations, and Environmental Services. Agriculture does not exist in a vacuum, but within a structure of public expectations for environmental protection, judicious use of natural resources, safety and public health. Alfalfa is a crop which contributes significantly to many public goals of soil conservation, protection of water quality, and air quality. Alfalfa is a crop with a good story to tell, one that is seldom heard beyond the farm gate. The western dairy sector and alfalfa production has been roundly criticized for environmental issues. Are forage growers capable of rising to address the issues of stewardship and water quality that the public expects? Profitability in the future may as much rely on the ability of farmers to address these public concerns and negotiate regulations as it is on producing tonnage and quality. The environmental benefits of alfalfa in rotation, its wildlife habitat, and soil conserving properties are key assets in envisioning more sustainable systems in the future.

CONCLUSION

While short-term trends have been discouraging for alfalfa and forage crops it is important to look at longer-term trends and to envision where we are likely to be in the future. The rapid expansion of dairy production in western states, mostly to meet world demand has created opportunities as well as difficulties. This period has revealed some key economic vulnerabilities of the cash hay-dairy sector which threaten economic sustainability in the future. Innovations to stabilize pricing arrangements and innovations to improve the productivity, quality, water use efficiency and environmental impacts of alfalfa are needed. These require knowledge-based and scientific approaches and cooperative efforts by farmers and industry.