

Arizona Review

economic perspectives on Arizona's agriculture and natural resources

Bartley P. Cardon: An Interview

Harry W. Ayer and Jimmye S. Hillman

For more than 75 years Bart Cardon has been involved with Arizona farming, ranching, and agribusiness. Reared as a farm boy in Arizona, Cardon entered the University of Arizona in 1935—taking his bachelor's and master's degrees in agricultural chemistry and soil microbiology. He earned a Ph.D. in enzyme chemistry and microbiology at the University of California, Berkeley in 1946. Returning to the University of Arizona, Cardon rose to the rank of professor, but left in 1954 to pursue a career in business. When academic service beckoned again in 1980, Cardon returned to the University as Dean of the College of Agriculture.

In agribusiness, Cardon's performance was equally outstanding. After assuming a leadership role in Arizona Flour Mills, he quickly recognized that success depended not only on perfecting production performance, but also on business acumen, marketing, and policy decisions. The establishment of Arizona Feeds in 1967 was a high point in Cardon's illustrious career and he remained Chairman until retirement in 1980. During this period, Cardon's career expanded enormously, while his technical and business leadership became recognized nationally and internationally. He made breakthrough innovations in cattle feeding, livestock management, and marketing of animal products. Cardon shared his experience in animal nutrition and product development throughout Arizona and beyond—consulting with U.S. firms and businesses in Asia, Australia, and Europe.

Cardon's ultimate—and perhaps greatest—contribution to his native state of Arizona has been through public service. As a leader in agriculture, he

served on numerous committees, boards, and public institutional groups—including the Governor's 1980 task force that authored the monumental 1980 Groundwater Management Act governing water use in Arizona. His many awards include the Distinguished Service Award from the American Feed Manufacturers; honorary Fellow of the American Society of Animal Science; "Man of the Year" by *Progressive Farmer*; the Lifetime Achievement Award from the College of Agriculture; and an Honorary Doctor of Science from the University of Arizona. The headquarters building at the Maricopa Agricultural Center—the University's major experimental farm—bears his name: the Bartley P. Cardon Agricultural Research Building. In 1997, a groundswell movement by friends and colleagues resulted in the creation of the Bartley P. Cardon Chair of Agricultural Economics and Policy. Cardon selected the Department of Agricultural and Resource Economics to house this endowed chair. The Department is proud to be given this honor.

Bart's professional and personal history bind him closely to agriculture. His sympathies lie with Arizona's farmers and ranchers. But his care does not mean he opposes change. Bart's career in education, research, and management has always encouraged new approaches to ever-present problems. And, although he does not always like it, he recognizes



Contents

Volume 1, Issue 1
Spring 2003

1 Bartley P. Cardon: an Interview
Harry Ayer and Jimmye S. Hillman

**3 Arizona Agriculture:
A Thumbnail Sketch**
Harry Ayer

**6 Greenhouse Tomatoes:
Do Shoppers Really Buy Them?**
Gary D. Thompson

**8 Conservation Programs in the New Farm Bill:
Funding Opportunities for Arizona?**
George B. Frisvold

11 Arizona's Agricultural Situation
Satheesh Aradhyula

**12 Riparian Areas Generate
Property Value Premium for Landowners**
Bonnie Colby and Steven Wishart

15 New at AREC and the Cardon Endowment Program

Arizona Review

Economic Perspectives on
Arizona's Agriculture and
Natural Resources

Arizona Review is published biannually, spring and fall, by the Department of Agricultural and Resource Economics at The University of Arizona, and by the Cardon Endowment for Agricultural Economics and Policy, also at The University of Arizona.

Arizona Review is available at
<http://ag.arizona.edu/arec/pubs/azreview.html>

Editor Harry Ayer

Associate Editor Nancy Bannister

Layout and Design Nancy Bannister

Contents of this magazine may be reprinted without permission, but with credit to the authors and *Arizona Review*. Opinions expressed do not necessarily represent those of the Department of Agricultural and Resource Economics, The Cardon Endowment, or The University of Arizona. Comments are welcome, and may be sent to the editor at the Department of Agricultural Land Resource Economics, PO Box 210023, The University of Arizona, Tucson, Arizona, 85721-0023, or by email to ayer@ag.arizona.edu.

Individual copies available upon request from the Associate Editor at nancyb@ag.arizona.edu

Arizona Review
economic perspectives on Arizona's agriculture and natural resources

Welcome

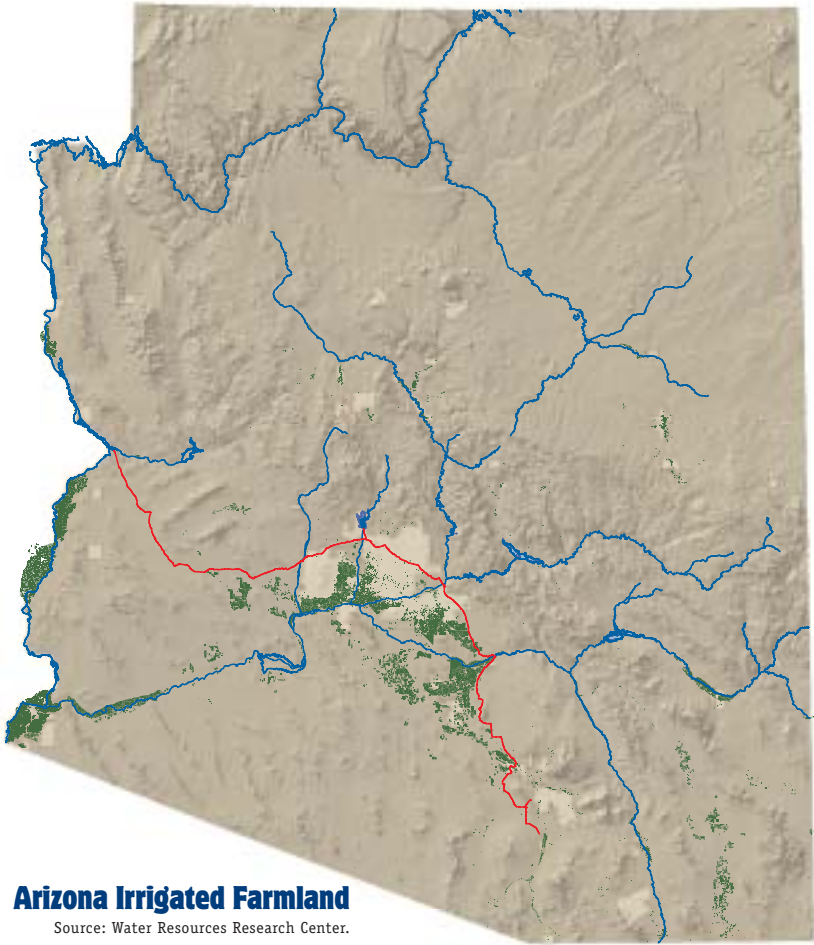
to our inaugural issue of the *Arizona Review*! The *Review* is published twice annually (spring and fall) by the Department of Agricultural and Resource Economics and the Bartley P. Cardon Endowment in Agricultural Economics and Policy. Our aim is to provide a practical and reasoned economic perspective on farming and ranching, agribusiness, food, and resource issues. We trust the *Review* will become a valuable resource to you our readers.

In this issue Dr. Bart Cardon gives his perspectives on Arizona agriculture and what the future holds. Other articles discuss conservation programs in the new farm bill, consumer demand for greenhouse tomatoes, and the effect of neighboring riparian areas on property values. Particularly appropriate for the inaugural issue is the article titled "Arizona Agriculture: A Thumbnail Sketch" by the editor. In forthcoming *Reviews*, articles will discuss issues related to Bt cotton, government farm program payment limits, and the trust factor in agribusiness management.

I am proud of this inaugural issue of the *Arizona Review* and would like to thank all the contributors. Special thanks to Editor Harry Ayer, Associate Editor Nancy Bannister, and the generous support of the Department's Cardon Endowment. Please feel free to send comments or ideas for future articles to Professor Ayer. Also, feel free to call me at 520-621-6242 or email me at aker@ag.arizona.edu to discuss issues of importance to Arizona's agricultural, food, and resource interests.

—Alan Ker, Head
Department of Agricultural and Resource Economics
University of Arizona





Swooping down to a lower altitude, we can spot the pens of a few very large dairy lots, over 80 percent of them located near Phoenix. Nearly 93 percent of the state's milk cows are on farms with 500 or more head. In 1997 there were only 79 such operations, 67 of them in Maricopa and 9 in Pinal counties. These highly productive operations supply most of the milk for the State's rapidly growing population. Even fewer large beef cattle feedlots—only about a dozen statewide, but again producing huge numbers—punctuate the landscape in Pinal County to the south of Phoenix and Yuma County in the southwestern corner of the state. Of all fat cattle sold in 1997, 99 percent came from 13 feedlots selling 500 or more head per year—3 in Maricopa, 1 in Apache, 8 in Pinal, and 1 in Yuma counties.

Our aerial view shows that Arizona's population (5.1 million in 2000) lives mostly in two urban centers, Phoenix and Tucson, and just a few other small cities. In 1997, less than 4,000 farmers actually lived on the farms they operated. The urban areas account for the lion's share of the state's economic activity, and by many measures, agriculture only a very small portion. In 1999, for example, Arizona's agriculture accounted for 1.5 percent of gross state product, down from 1.8 percent ten years earlier and down from near 10 percent prior to World War II.

Arizona Agriculture: A Thumbnail Sketch

Harry Ayer

ayer@ag.arizona.edu
 Professor and Extension Economist
 Department of Agricultural and Resource Economics
 University of Arizona

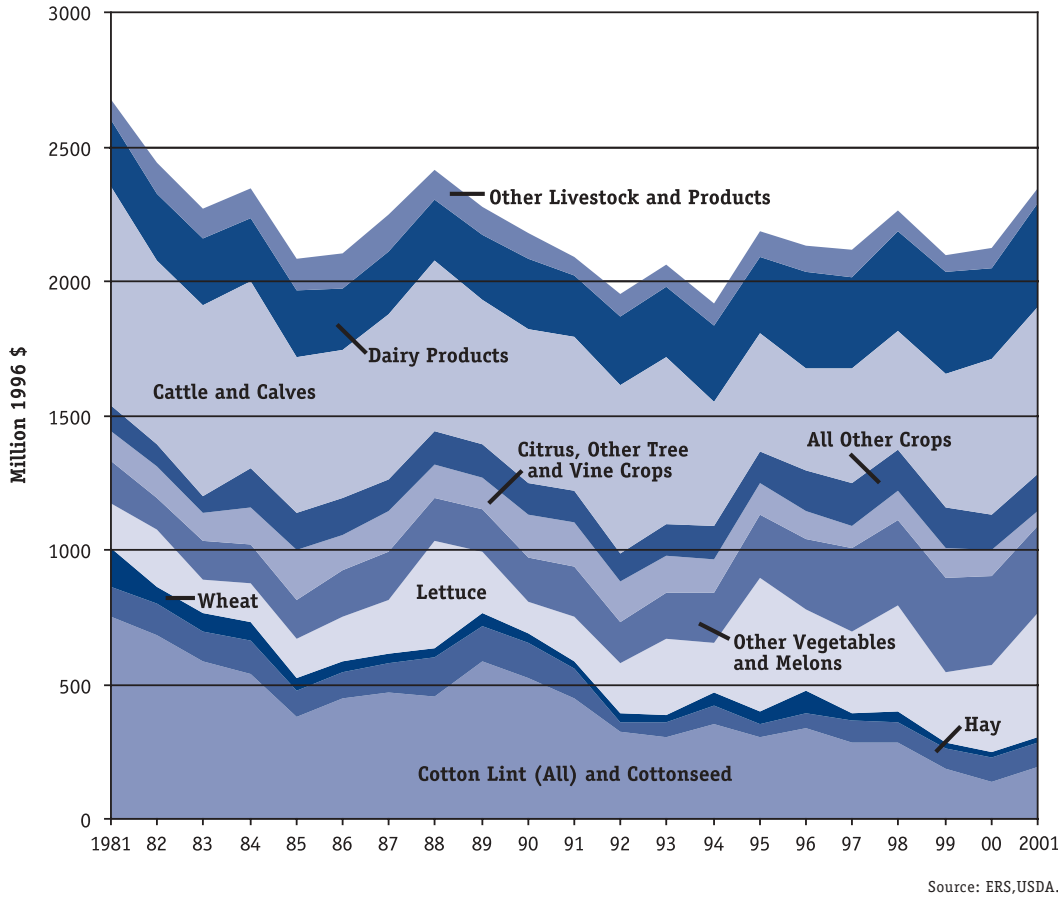
Viewed from high above, Arizona's deserts and highlands paint the landscape in ochers and umbers and gray-green earth tones. Cattle ranching spreads thinly over nearly the whole of the state's 73 million acres (sixth largest in the United States), most of it (some 83 percent) federal or state or reservation land. But here and there sprinkled in the lowland desert of the southern third of the state, irrigation tints the earth's canvas with more vibrant greens. These areas of mostly cotton, alfalfa, wheat, lettuce and other vegetables, melons, and citrus occupy less than a million acres, but in contrast to the low-yielding grasslands, irrigation water and high technology make these fields some of America's most productive.

Agriculture accounts for approximately the same share of gross domestic product in the U.S. and in several well-recognized "big agriculture" states such as California and Texas. Beyond this direct contribution to the state's economy, production agriculture links indirectly backward and forward to state input suppliers and processors, and farm and ag-related families make consumption expenditure—all economic activities that add to the economy. The sum of these direct, indirect, and consumption (induced) effects from agriculture accounts for approximately 5 percent of the state's GSP.

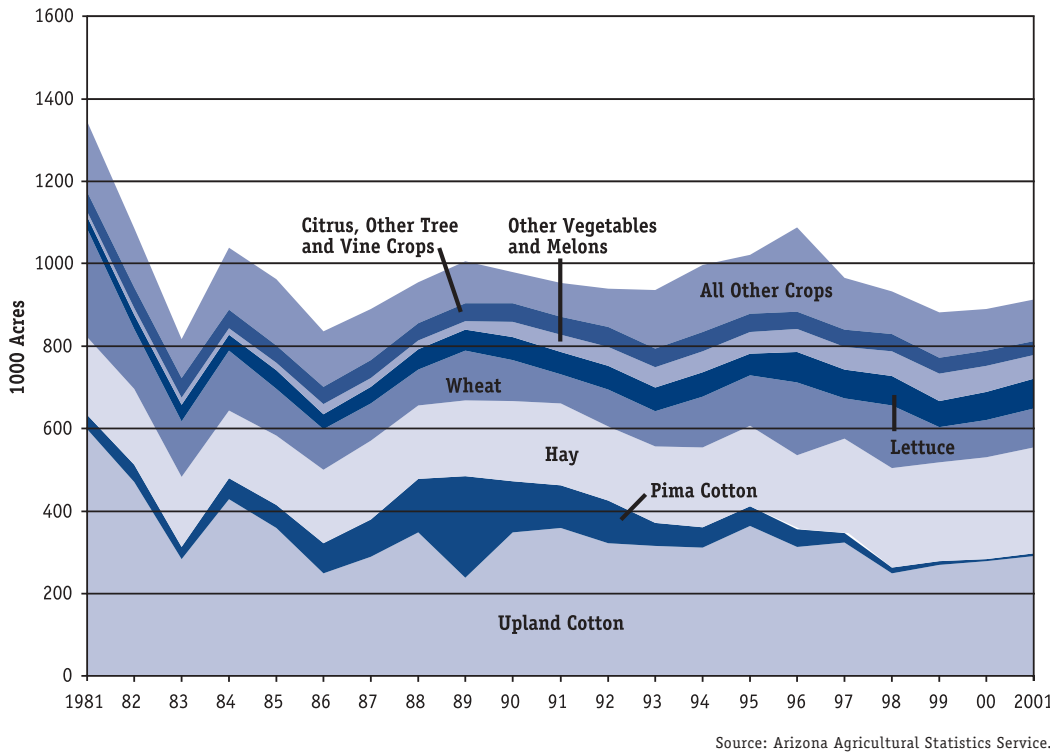
Sector Sales

Real cash receipts over time provide one measure of the economic health of Arizona agriculture. During the first half of the 21-year period 1981–2001, real income trended notably down, but since the early 1990s it has moved higher, albeit with ups and downs and still not reaching the level of the early 1980s. Within the total, some sectors changed

Real Cash Receipts, Key Agricultural Commodities, Arizona, 1981–2001



Acres Harvested, By Crop, Arizona, 1981–2001



markedly, even during the last 10 years. Real cotton receipts moved persistently downward from near \$700 million in the early '80s to now less than \$200 million in 1999–2001—shifting cotton's rank from one of the two top sectors to a distant fifth place below lettuce, other vegetables and melons, cattle and calves, and dairy products. Cattle and calves (combined fat cattle and feeder calves) have also trended generally downward, with cash receipts in the early 1980s in the \$700–\$800 million range, falling to around \$400 million in the mid-1990s, and then recovering somewhat to the \$500–\$600 million level in 1999–2001. These numbers reflect declines and then some increases in the numbers of both cow/calf and feedlot cattle. Lettuce, other vegetables and melons, and dairy products, countered the downtrends. Real cash receipts for lettuce increased from approximately \$150 million in the early 1980s to \$300–\$400 million from 1995 onward. Other vegetables and melons (as a group) showed similar beginning and ending values. Real dairy receipts increased from around \$250 million in the early 1980s to approximately \$350 million from 1996–2001.

Cropped Acreage

For the most part, crop acreage follows the trends of cash receipts, upland cotton being the key exception. Its acreage declined sharply in the early 1980s, but since the mid-1980s shows no clear trend up or down—this in contrast to the long-term downtrend in upland prices and cash receipts. After an approximately five-year spurt in acreage in the late 1980s and early 1990s, Pima acreage has tailed off to very low levels. Hay acreage expanded with the increase in dairy receipts,

and lettuce and other vegetables and melon acres increased with receipts in these sectors. Yuma County experienced the bulk of the expansion in vegetable and melon acreage.

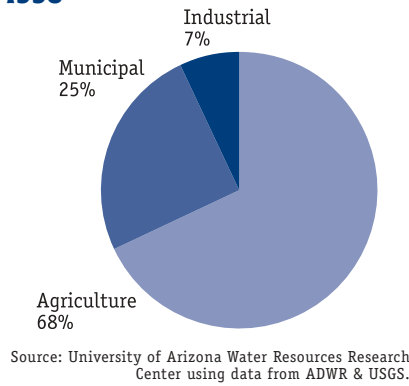
Water

Historically, water issues captured the attention of not only farmers and ranchers, but also Arizona society more generally. All crops rely almost exclusively on irrigation water, and agriculture accounts for nearly 68 percent of all water used, even though less than one-half of one percent of Arizona's population farms. Legal and political activities to secure water rights and regulate water use reflect the competition for this scarce resource. Indian claims to a large share of the state's surface water, protracted negotiations about agriculture's use of water in the recently agreed Third Management Plan of the Groundwater Management Act, and the diversion of massive amounts of Central Arizona Project water from agriculture to urban uses all reflect the long and continuing battle for rights to Arizona's limited water. The cost of energy also affects water use because nearly 40 percent of irrigation water comes from groundwater sources (often deep) pumped to the surface using costly fuel. Even the massive Central Arizona Project that brings surface water some three hundred miles from the Colorado River to help irrigate crops in central and southern Arizona must be pumped nearly 2,000 feet uphill at considerable expense. Finally, water issues are at the sharp edge of ranching concerns. Both ranchers and those interested in recreation and the environment try to secure the right to use riparian areas on public lands historically leased for ranching.

Government Subsidies

Government subsidies also form an important part of Arizona's agricultural story. Federal farm program payments reached a high of 48 percent of total net farm income in 1983—a year of unusually low net farm income. Since that time, total subsidies have fallen, but in the last five years have still accounted for 7 to 17 percent of the state's net farm income. The distribution of these subsidies among farming sectors and even among farms within sectors, however, has been highly skewed. The large beef, hay, fruit, and vegetable sectors received almost no program subsidies. Rather, cotton and wheat

Water Use by Sector, Arizona, 1998



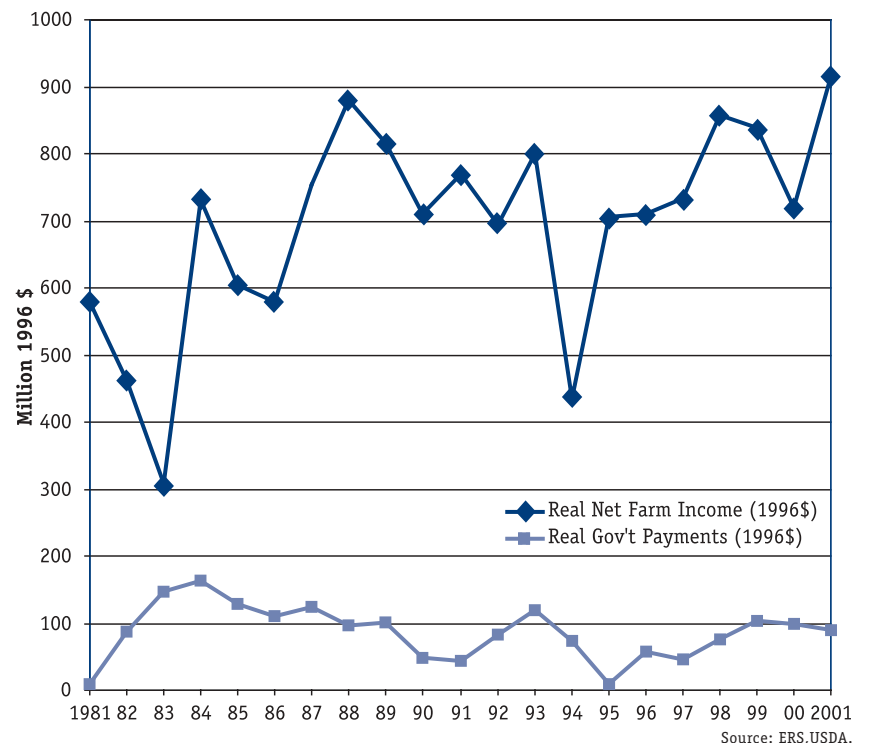
producers received most federal payments, and large cotton farms received the bulk of the subsidies. In 1998, 1999, 2000, and 2001, when world supplies outstripped demand and cotton prices fell, these subsidies reached record or near-record proportions.

Foreign Trade

Arizona agriculture relies, to a considerable extent, on foreign trade. The state exports over 80 percent of its cotton and a sizeable share of its wheat. Mexico supplies about 15 percent of the feeder cattle to Arizona feedlots. The fruit, vegetable, live animal, dairy, and seeds sectors also export portions of production. Current and upcoming rules and regulations of both the North American Free Trade Agreement (NAFTA) and the World Trade Organization (WTO) will affect the economic health of Arizona agriculture. **AR**

Since 1970 Harry Ayer has focused his applied research and outreach on agricultural policy issues, and particularly the periodic federal Farm Bills, water policy in Arizona, and trade policy. For many years he edited a magazine that brought sound economic assessment of food, farm, and resource issues to a wide U.S. audience, and especially farm and resource interest groups and policy makers. More recently he helped launch a similar publication in Europe, an effort that recognizes that many food, farm, and resource issues have international implications and interest.

Real Net Farm Income and Government Payments, Arizona, 1981-2001



Greenhouse Tomatoes: Do Shoppers Really Buy Them?

Gary D. Thompson

garyt@ag.arizona.edu

Professor

Agricultural and Resource Economics
University of Arizona

Anyone familiar with the produce section in their local supermarket knows the array of fresh tomatoes available to shoppers has grown considerably in the last five years. In the past, beefsteak tomatoes dominated the produce section. Along side beefsteaks, shoppers now find roma or plum tomatoes, cherry tomatoes, greenhouse tomatoes, and tomatoes on the vine week after week throughout the year. Some supermarkets even sell yellow, orange, and “zebra” striped varieties. Tomatoes aren’t just piled on top of each other in supermarket displays: greenhouse tomatoes come nestled in a plastic cup, tomatoes on the vine are sold in net or plastic bags, and cherry tomatoes are packaged in plastic “clamshells.” Quite clearly, a tomato is no longer just a tomato at your local supermarket.

One of the most prominent members of the growing array of tomatoes at retail is the greenhouse tomato. Sometimes referred to as a hothouse or hydroponic tomato, the manner of production distinguishes greenhouse tomatoes. Producers grow greenhouse tomatoes in a more controlled environment rather than in the fields. Although shoppers never see greenhouse tomatoes under cultivation, they appreciate the results. The more controlled growing environment results in fewer blemishes, more uniform shape, more even color, and, some would argue, better flavor than found in field-grown tomatoes.

Some shoppers are fond of greenhouse tomatoes and willingly pay higher prices for them. Other shoppers are more skeptical and won’t pay any more. Given these varied reactions, have greenhouse tomatoes remained a niche item? Or have they become a mainstay of the produce section alongside beefsteak and other tomatoes?

Collecting Evidence

To answer these questions, researchers cannot just download data from websites at the U.S. Department of Agriculture. Supermarkets use scanners to collect reliable sales data on many items, but it’s proprietary. Put bluntly, up-to-date data on retail transactions have commercial value, which is why corporations such as ACNielsen and Information Resources, Inc. purchase scanner data from supermarket chains such as Fry’s, Safeway, and Albertsons. Food manufacturers seeking to understand how their products fare at retail buy the processed scanner data.

Fresh produce purchases have historically been harder to track than, say, breakfast cereal sales. Not all produce items carry bar code labels for scanning at checkout. Instead, individual pieces of fruit or vegetable items have price-lookup or “PLU” stickers. Cashiers at checkout key in the four or five digits from the PLU stickers—a process subject to human error. Sale by piece instead of weight also compli-

cates tracking. Lettuce sells by the head, not by the pound, for example. Corporations collecting scanner data avoid PLU data because of human error and the lack of weight measurements for all products.

More recently, some companies have begun to collect PLU information from supermarkets. For research purposes, these PLU data coupled with scanner data for the limited number of produce items with bar codes now provide a first glimpse of purchasing patterns of fresh produce in supermarkets.

Our research team, supported by USDA funds, purchased data from supermarkets in six metropolitan areas—Albany (New York), Atlanta, Chicago, Dallas, Los Angeles, and Miami. The supermarkets in each of these metropolitan areas accounted for at least 60 percent of retail food sales. Jointly, these six areas account for almost 15 percent of supermarket sales and almost 15 percent of the U.S. population.

What about Those Tomatoes?

The variety of tomatoes sold can be surprising. One chain offered almost 30 different types of tomatoes each week! To make the analysis manageable, we identified five generic categories of tomatoes: regular, greenhouse, on the vine, roma, and cherry tomatoes. Although all tomatoes on the vine are greenhouse grown, they are marketed and sold as a separate category.

Any produce item moving from niche status to the mainstream must be available year-round. Greenhouse tomatoes have become increasingly available throughout the year. Availability varied across the six metropolitan areas, but Los Angeles is representative of general trends in availability. The first figure shows the percentage of stores in all supermarket chains in Los Angeles selling greenhouse tomatoes. By mid-1998, nearly all stores in the chains—from Beverly Hills to Compton—were selling greenhouse tomatoes.

Availability alone is not enough to get shoppers to buy greenhouse tomatoes. If prices are too high, some shoppers will prefer cheaper tomatoes. The second figure shows average three-year prices (1997–1999) for greenhouse, on-the-vine, and regular tomatoes for each metropolitan area. Regular tomatoes were cheaper than greenhouse tomatoes in every market except Atlanta. Prices of greenhouse and on-the-vine tomatoes averaged anywhere from about \$0.30/lb. more in Albany to about \$1.00/lb. more in Dallas.

Greenhouse Tomatoes: Niche to Mainstream?

Thus, although greenhouse tomatoes have become widely available, they are more expensive than regular field-grown tomatoes. Have greenhouse tomatoes managed to move beyond niche status to the mainstream despite higher prices? Market share gives another measure of mainstream status. Market shares of greenhouse tomatoes—including beefsteak and on-the-vine varieties—increased in all metropolitan areas studied. Greenhouse tomatoes captured the largest market shares in Los Angeles, accounting for over half of all dollar sales in the last three quarters of 1999. Even in Chicago where market shares of

greenhouse tomatoes are the lowest, the share increased to account for about one quarter of fresh tomato sales.

Greenhouse tomatoes—beefsteak and on-the-vine varieties—have clearly moved into the mainstream at supermarkets in places like Los Angeles, Chicago, Dallas, and Atlanta. Supermarket chains have committed to selling greenhouse tomatoes in all their stores whether upscale or working class. Despite higher prices for greenhouse tomatoes, their market shares have grown to account for a quarter to half of all fresh tomato sales in the supermarket chains studied. These results indicate some shoppers are indeed willing to pay higher prices for perceived higher value.

Implications for Arizona Agriculture

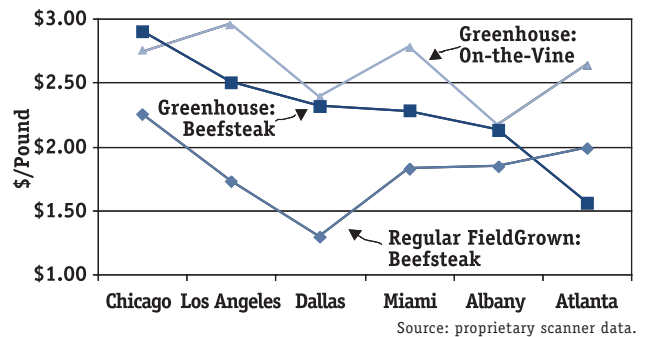
Acceptance of new products by shoppers raises some “chicken-and-egg” questions. Does innovation on the part of growers “push” the acceptance of new products by shoppers at retail? Or, do shoppers’ desires for different products “pull” new products onto shelves at retail? The joint push by growers and shippers and pull of shoppers and supermarket managers is likely responsible for acceptance of new products such as greenhouse and on-the-vine tomatoes.

This joint push and pull clearly implies more coordination of production, packing, shipping, and transport of perishable produce to retail venues. Growers accustomed to selling their field-grown products by daily telephone communication with supermarket buyers, brokers, and wholesalers may find more coordination to be a new, challenging way to operate. Greenhouse growers, on the other hand, may welcome coordination because they harvest tomatoes

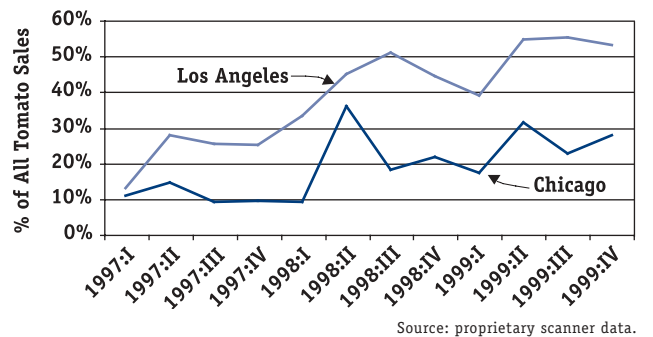
Availability of Greenhouse Tomatoes in Los Angeles Supermarket Chains



Average Tomato Price, Six U.S. Cities



Market Shares, Greenhouse and On-the-Vine Tomatoes, Chicago and Los Angeles



daily for months on end from a single greenhouse. With less variability in harvests, greenhouse growers are more willing than their field-grower counterparts to sign contracts with supermarkets that guarantee deliveries every week. As supermarket buyers become more accustomed to contracting rather than buying on daily spot markets, those same buyers may begin to pressure growers and shippers of field-grown products to engage in contracts. As a result, acceptance of new products such as greenhouse tomatoes can have far-reaching implications for how growers and shippers conduct their business. **AR**

Gary D. Thompson conducts research on the production and marketing of perishable products such as fresh vegetables. He has documented how grower-shippers employ sophisticated coordination mechanisms to produce year-round supplies of fresh vegetables. He has also studied retail demand for new products such as bagged refrigerated salads and selected organic foods.

Conservation Programs in the New Farm Bill Funding Opportunities for Arizona?

George B. Frisvold

frisvold@ag.arizona.edu

Associate Professor and Extension Specialist
Department of Agricultural and Resource Economics
University of Arizona

From 1985 to 2002, USDA conservation expenditures have tripled, while direct conservation payments to agricultural producers have become a significant component of federal farm support. Producers receive direct payments for retiring environmentally sensitive land, conservation easements, and adoption of more environmentally benign technologies or management practices. Nationally, conservation payments accounted for nearly a quarter of direct payments to producers in the mid-'90s—a time with relatively high market prices and lower commodity program payments. Today, conservation payments account for about nine percent of total farm payments.

On October 5, 2001, the Boehlert, Kind, Gilchrist, Dingle Substitute Amendment to the House version of the 2002 farm bill narrowly failed by a 200-226 vote. The amendment would have dramatically scaled back traditional commodity program payments, while expanding a host of conservation payments. The 2002 farm bill eventually signed into law expanded traditional commodity support, but also increased funding for almost every existing USDA conservation program. According to the Congressional Budget Office, spending for conservation and environmental programs will rise by 80 percent to a projected 10-year total of \$38.6 billion.

Despite increases in national funding, Arizona producers, to date, have had limited access to conservation payments. Conservation payments account for less than 4 percent of direct farm payments in Arizona (compared to 9 percent nationally). This has been because previous farm bills focused conservation funding on environmental land retirement programs that were not economically attractive in irrigation-dependent regions.

With recent changes in farm legislation, Arizona producers may be able to capture a greater share of national conservation funding. The new farm bill puts greater emphasis on payments for adopting conservation practices (including water conservation) on working lands, while earlier program changes increase economic incentives for environmental land retirement of irrigated lands.

Why Has Arizona's Access to Conservation Programs Been Limited?

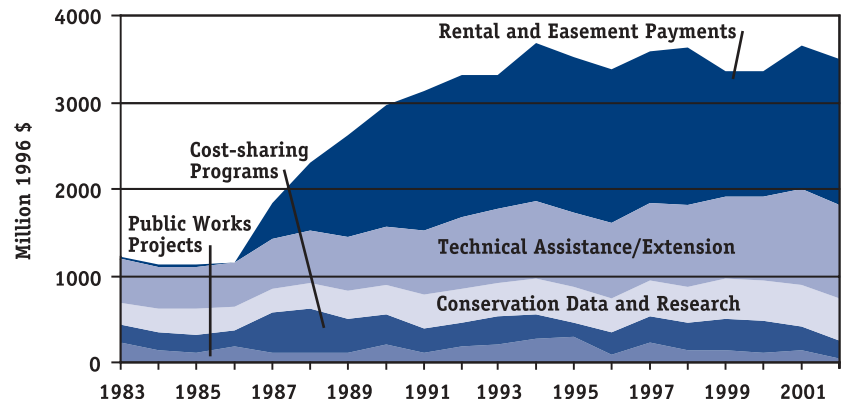
Since the 1980s, USDA conservation funding has more than tripled in real terms (see figure). Growth in USDA rental and easement payments, primarily through the Conservation Reserve Program (CRP), accounted for two-thirds of this growth. The CRP is USDA's single largest conservation program, accounting for over 40 percent of conservation expenditures. Under the CRP, established in the 1985 farm bill, farmers receive annual federal payments for idling cropland under 10- to 15-year contracts. Over 30 million acres are idled under the program. Landowners place bids to USDA that are ranked based on their cost and an Environment Benefit Index that assigns points according to the land's potential for erosion control, migratory bird habitat, water pollution control, and other environmental factors.

Arizona landowners have not been able to benefit from the CRP, however, because payments are based on local dry-land rental rates or dry-land productivity of the land. In irrigation-dependent Arizona, payment rates based on dry-land productivity provide little incentive for participation. In 2001, there was only one CRP contract in Arizona, covering 33 acres and paying only \$9 per acre. In contrast, Arizona irrigated cropland rental rates—a measure of private returns to leasing out land—averaged \$135.

CREP Expands CRP Funding to More Areas

The Conservation Reserve Enhancement Program (CREP), established under the 1996 farm bill and extended under the 2002 farm bill, provides greater incentives for farmers engaged in irrigated agriculture to participate in the CRP. Like the regular CRP, the CREP provides farmers with federal rental payments for 10- to 15-year land retirement. But, the CREP differs from the regular CRP in several respects. First, payments under the CREP can be much larger than rental payments under the CRP. CREP also provides additional funds for adoption of conservation practices and first-year signing bonuses. Federal funding has ranged between \$1,300 and \$2,500 per acre.

USDA Conservation Expenditures, 1983–2002



Source: "Overview of Conservation Programs and Expenditures." Chapter 6.1 of *Agricultural Resources and Environmental Indicators, 2000*. USDA, Economic Research Service. http://www.ers.usda.gov/Emphases/Harmony/issues/arei2000/AREI6_1consoverview.pdf

Second, states play a more active role in program design and implementation, allowing individual states to develop programs to target specific needs. Maryland's program addresses water pollution affecting Chesapeake Bay and compliance with the Clean Water Act, New York's focuses on compliance with the Safe Water Act, while Washington and Oregon's programs focus on protecting endangered species habitat. Since 1996, 24 states have had their CREP proposals approved, two have proposals pending, and two are currently developing proposals. State enrollment targets range from 5,000 to 100,000 acres. Five states have large programs of roughly \$250 million, with the federal government paying 80 percent of the cost. Arizona currently does not operate a CREP, nor is one in the development stage. Both USDA and a state's governor must approve a CREP project and states must provide 20 percent matching funds. States must develop proposals for submission to their governor based on comprehensive participation of state interests that include agricultural groups, conservation groups, watershed councils, and tribal governments, as well as state and federal agencies.

Third, CREP contract bidding and bid ranking are state-specific, rather than conducted at a national level. So, once an individual state's CREP is approved, farmers in that state may sign up at any time without going through the nationally competitive bidding process of the regular CRP.

Fourth, states may tailor programs to encourage participation of irrigated agriculture. Oregon and California CREPs provide federal payments based on irrigated rental rates (rather than dry-land rates) if saved water is applied toward approved environmental objectives. California's program is relatively small, targeting 12,000 acres in the North Central Valley. Irrigated rice land receives payments of \$165 per acre per year, while other irrigated land receives payments of \$100 per acre. Oregon's program, in contrast, is quite large, targeting 100,000 acres and budgeted for \$250 million dollars, with \$193 million coming from the federal government. The Oregon program seeks to restore riparian areas and to maintain instream flow for trout and salmon listed under the Endangered Species Act. Farmers are eligible for payments based on the rental value of irrigated land if they lease water to the state of Oregon. The leases require producers to divert less water for irrigation in order to enhance instream flow. Farmers who retire their land and lease their water for instream flow receive annual rental payments up to \$150 dollars per acre. Water lease

contracts are for two years. Farmers retain the option of renewing lease contracts or reclaiming use of their water after the two-year contract period and receiving the lower, dry-land rental payment.

It remains to be seen, however, how well these programs will encourage farmers to enter into long-term water lease agreements with state agencies. The California program is new, first approved in 2001. In the Oregon program, approved in 1998, participation in the state water lease and irrigated rental payment contracts has remained low. According to the American Farmland Trust:

"Historically water rights have assumed an almost sacred status in many parts of Oregon. Of those farmers with water rights on land enrolled in CREP, they have generally retained the rights for use on the farm and taken the base rental rate rather than lease the water for instream flow."

In both states, landowners have raised questions about what happens to the water at the end of the 15-year contract period, especially if the water has been used to maintain or create habitat for species listed as threatened or endangered. In California, USDA, state agencies, and the U.S. Fish and Wildlife Service have engaged in lengthy negotiations to clarify such questions for potential participants.

Despite the up-front negotiation costs, many states have found participation in the CREP to be attractive. The program, acting somewhat like a grants program, provides federal funds to agricultural landowners and farm operators to voluntarily retire land and undertake conservation practices, helping states comply with numerous federal environmental laws. It also provides federal funds to leverage state environmental objectives. For example, CREP allows state agencies to lease water or acquire conservation easements at a fraction of the cost by "piggybacking" on long-term federal leases. Through CREP, the

federal government provides roughly the fair market rental rate for land for up to 15 years. In many cases, the present value of a 15-year contract will equal 75 percent of the cost of a permanent conservation easement. A state could then obtain a permanent easement by offering just the remaining 25 percent.

New Farm Bill Emphasizes Conservation on Working Lands

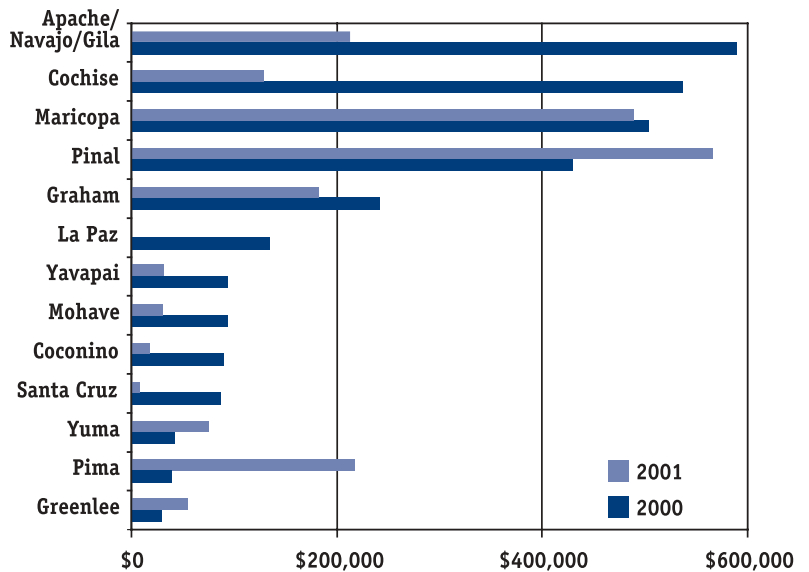
While the growth of land retirement programs accounted for most of the increase in USDA conservation funding from 1985–2002, the 2002 Farm Act places greater emphasis on conservation measures on working lands. The largest of these programs is the Environmental Quality Incentives Program (EQIP). Established in the 1996 farm bill, EQIP provides technical, financial, and educational assistance to farmers and ranchers adopting conservation practices and technologies on their operations. EQIP offers 5- to 10-year contracts that provide cost-sharing and incentive payments for conservation practices. Nationally, half of the funding for EQIP is targeted to natural resource concerns related to livestock. Under the last farm bill, EQIP funds were authorized at \$1.3 billion over 7 years. Under the new farm bill, EQIP funding begins at \$0.4 billion in 2002 and ramps up to \$1.3 billion *per year* by FY 2007.

In Arizona, nearly two-thirds of EQIP payments have gone to support water conservation and irrigation technologies, with nearly 30 percent going to maintain range health. EQIP funding in the state has grown from \$2 million in 2000, to \$2.9 million in 2001. Arizona's allocation for fiscal year 2002 was initially \$3.85 million, but the Secretary of Agriculture released an additional \$0.9 million in EQIP funds to assist farmers and ranchers in preventing further damage to natural resources resulting from the ongoing drought.

The EQIP program has provided payments to agricultural producers in counties that generally receive less traditional commodity program support (see figure). The northeastern counties and Cochise County are relatively large recipients of EQIP funds. In Arizona, 40–45 percent of EQIP funds have been obligated to contracts assisting Indian agricultural producers.

The 2002 Farm Act also includes within EQIP a Ground and Surface Water Conservation program that would provide payments to producers to improve irrigation efficiency or convert to less water-intensive crops. USDA has not released final

EQIP Payments to Arizona Counties



Source: Arizona Farm Service Agency, 2000 Year End Report and 2002 Year End Report. www.fsa.usda.gov/az/az.htm

rules on how this program would operate, however. Smaller USDA programs also provide limited funding for farmland protection, easements for wetlands, and cost-sharing payments to private landowners who want to develop and improve wildlife habitat.

The Future of Conservation Funding?

There is interest in placing even greater emphasis on conservation or “green payments” in the future as a means for the United States to keep and further its international trade commitments. Under the Uruguay Round Agreement on Agriculture (URAA), World Trade Organization (WTO), members committed to reducing trade-distorting forms of domestic farm support. WTO rules treat direct payments to producers under environmental programs as “green box” payments that are exempt from reduction commitments. With the signing of the Doha Ministerial Declaration in November 2001, negotiations to continue URAA reforms are underway. For the Doha Round, the U.S. government has taken a position that “Members shall agree to eliminate all non-exempt domestic support by a date to be established in these negotiations.”

One final note, though. While the 2002 Farm Act authorizes expanded conservation payments, actual funding levels will depend on annual Congressional appropriations. **AR**

George Frisvold conducts research and outreach on environmental policies and natural resource management issues of importance to Arizona. His program includes ongoing work on agricultural biotechnology, pesticide use and regulation, border environmental management, and the relationship between federal farm programs and resource use.

Arizona's Agricultural Situation

Satheesh Aradhyula

satheesh@ag.arizona.edu

Associate Professor

Agricultural and Resource Economics

University of Arizona

President Bush signed the Farm Security and Rural Investment (FSRI) act of 2002—the “Farm Bill”—into law on May 13, 2002. Cotton and dairy, and to lesser extent wheat, corn, and barley, provisions affect Arizona agriculture. Most of the commodity provisions closely follow those in previous legislation, especially marketing loan benefits and fixed direct payments to program participants. The new farm bill gives farmers the option of updating program base to the recent 1998 to 2001 period. This base update allows some farmers to increase their direct payments. Also, a new FSRI program provides counter-cyclical payments (CCP) whenever the effective price for program commodities falls short of the government-set target price. Payments under CCP are based on either historical or updated (1998–2001) base acreage and yields. For the dairy sector, the 2002 Farm Act continues the milk price support program, the export incentive program, leaves the milk marketing order system unchanged, and adds a new Milk Income Loss Contract (MILC) program. Analysts expect the new FSRI provisions to modestly increase Arizona and U.S. cotton and milk supplies, thus putting downward pressure on prices.

USDA estimates show Arizona farmers are expected to have harvested 239,400 acres of cotton in 2002, some 58,100 fewer than in 2001. Although the estimates show yields increasing by 90 pounds an acre, total production of all cotton in 2002 is expected to be only 614,000 bales, 13 percent less than

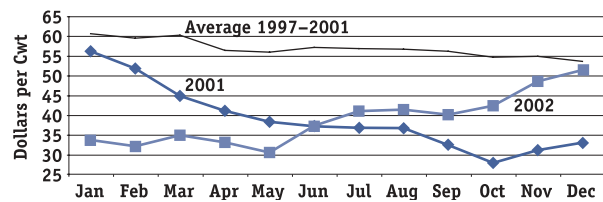
in 2001. After staying well below the 1997–2001 average levels for about 18 months, cotton prices began recovering somewhat and approached the average levels by 2002 year end. While U.S. mill use is in its fourth season of decline and its lowest level since 1986–87, foreign cotton consumption has seen significant increases. Increases in foreign cotton consumption are projected to more than offset the reduction in US mill use for the 2002–03 season.

Arizona produced 1.845 million tons of alfalfa hay in 2002, up 7 percent from 2001. As in 2001, according to USDA estimates, Arizona alfalfa prices stayed below the 1997–01 averages early in the year but picked up in later months. Prices in 2002 were higher than 1997–2001 averages by about 5 percent.

As of December 1, 2002, the national inventory of cattle on feed for slaughter had decreased by 1.149 million head—a drop of 8 percent from the previous year. Cattle on feed inventory in Arizona followed the national trend, although by a smaller percentage decrease. On December 1, 2002, Arizona had 295,000 head of cattle on feed, down 3 percent from a year earlier. Arizona calf prices continue to be above the 1997–2001 averages and in recent months about the same as prices a year earlier.

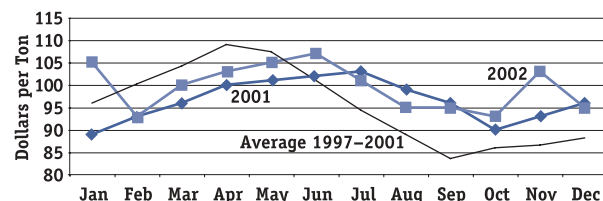
Arizona slaughter steer and heifer prices in 2002 began at the 1997–2001 average, but about 15 percent lower than 2001 prices. However, in contrast to 2001 when prices steadily decreased over the year, prices rose in 2002 with

Arizona Upland Cotton Prices



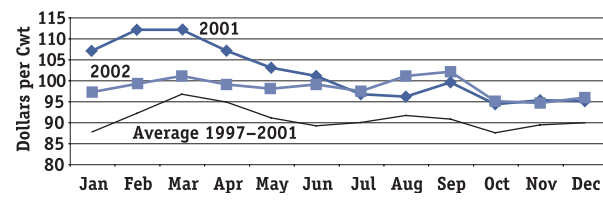
Source: NASS

Arizona Alfalfa Prices



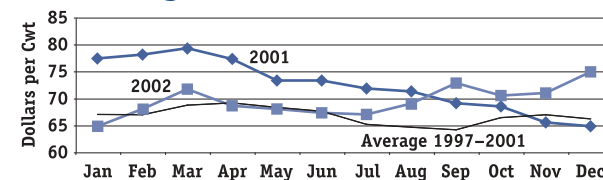
Source: NASS

Arizona Calf Prices



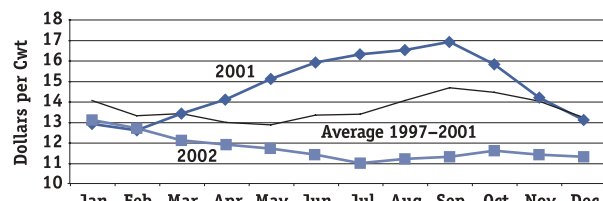
Source: NASS

Arizona Slaughter Steer and Heifer Prices



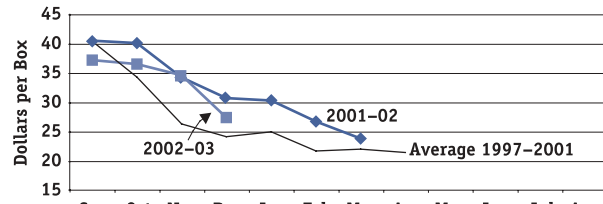
Source: NASS

Arizona Milk Prices



Source: NASS

Arizona Lemon Prices



Source: NASS

Continued page 15.

Riparian Areas Generate Property Value Premium for Landowners

Bonnie Colby

bcolby@ag.arizona.edu

Professor

Agricultural and Resource Economics
University of Arizona

Steven Wishart

former graduate student

Agricultural and Resource Economics
University of Arizona

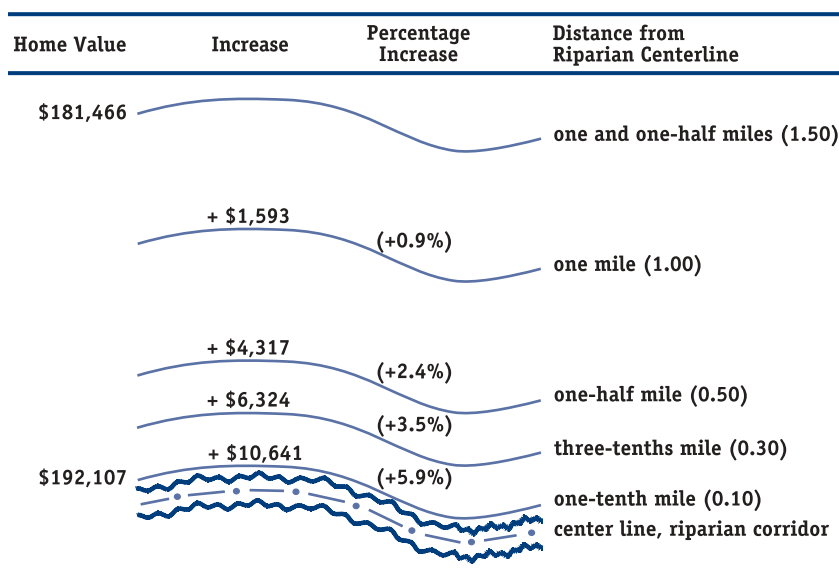
The future of riparian corridors in Arizona's desert regions has become a public policy concern due to the rapid decline in riparian areas after groundwater pumping accelerated in central Arizona in the 1950s. Desert riparian areas form ribbons of green, with cottonwood, mesquite, and willow trees that depend on a shallow depth of groundwater in order to survive. Riparian corridors support a wide variety of birds and other wildlife, which could not live in the desert without access to riparian areas. These areas not only offer public benefits such as flood control, water quality filtration, recreation, open space, and wildlife habitat, they also attract tourists who come to view that wildlife and they provide benefits to nearby residents in the form of increased private property values. Groundwater pumping affects riparian areas when it causes the water table to drop beyond reach of the riparian plants.

In 2001, the Arizona Water Commission (after 18 months of deliberations) produced a set of recommendations to fine-tune water management in

Arizona's Active Management Areas. One of these recommendations proposes protection for a specific list of riparian areas. The Commission's recommendations would require landowners seeking to drill new groundwater wells within a proposed riparian buffer zone (one-half mile from the center line of the watercourses in the listed riparian areas) to obtain their water from other sources. The proposal does not affect wells already in place, replacement wells, or new wells needed for livestock. The Commission recommended exemptions for those who do not have access to affordable alternative water supplies and for those with property for which hydrologic analysis demonstrates that the new well will not impact a riparian area. (Recommendations, maps, and a minority report on the riparian buffer zone are available at <http://www.adwr.state.az.us>.) Proposed limits on new wells in riparian buffer zones help assure landowners that when they refrain from drilling a new well in order to protect riparian corridors, others also must refrain. This can prevent landowners from inadvertently damaging riparian resources that benefit each of them, but which no individual landowner can protect alone.

A recent Department of Agricultural and Resource Economics study documents the effects of riparian corridors on property values in the Tucson metropolitan area. It has long been established that property owners receive a premium when selling homes and land near riparian areas in the arid western United States. Statistical analyses of actual property sales can show the size of this property value premium. This new analysis of thousands of residential home sales in northeast Tucson identifies a property value premium of three to six percent for homes located within half a mile of riparian areas, after accounting for the effects of lot size, home size, and other factors. This premium adds up to over \$103 million dollars for the 25,560 homeowners located within 1.5 miles of the riparian corridors, and most of this premium (\$77 million) is for homes in the first half mile.

Property Value Premium for Proximity to Riparian Corridor*



*2,000 square-foot, one-car garage, 15-year-old home on one-quarter acre (1999 northeast Tucson home values)

Source: B. Colby and S. Wishart, AREC, University of Arizona.

The analysis uses real estate and geographical information systems data for private property parcels within 2.5 miles of a 15 mile-long stretch of the Tanque Verde Wash and nearby riparian corridors proposed for protection. The statistical model analyzes 7,658 single family residence home sales from 1996–1999.

The model identifies the contributions to home prices of six variables: year of sale, home and parcel size, age of home, garage size, and distance to the riparian corridor. The accompanying chart illustrates this premium for a typical 2,000 square-foot home in the study area. The statistical model indicates a sales price for this home of \$192,107 when located one-tenth of a mile from the riparian corridor. However, if the same home was located 1.5 miles from the riparian corridor, its price falls to \$181,466. The difference of \$10,640 (6 %) is the increased property value from a closer proximity to the riparian corridor.

Riparian areas also generate a premium for undeveloped land. The increased property value for vacant land close to a riparian corridor ranges from 10 to 27 percent of the parcel value. For the owners of undeveloped parcels located within 1.5 miles of

riparian corridors in northeast Tucson, this premium totals over \$18.4 million.

If riparian areas are allowed to decline because of uncontrolled groundwater pumping, nearby property values could be affected. This is a concern for current landowners who paid a premium when purchasing their property and who count on recapturing it when they sell it. For property owners located in and near riparian corridors, limits on new wells provide some protection for a component of property value that otherwise could be lost. Policies that protect riparian areas from new groundwater wells also help protect the water table for existing well owners. Declines in the water table affect the vegetation, wildlife, and recreation opportunities of riparian areas. In addition, water table declines impose higher costs on well owners who must pump from deeper levels, and who may need to invest in deeper wells or may experience subsidence damage to their property. **AR**

Support for this research was provided by the Arizona Agricultural Experiment Station. The thoughtful discussions of the Arizona Water Commission, its Technical Advisory Committee and its Environment and Economics Working Group stimulated this research inquiry. Dr. Colby served on the Technical Advisory Committee and in the Working Group. The authors are solely responsible for the research findings.

Cardon Interview continued from page 1.

that changes in broader society require adjustments within agriculture. Bart's actions have promoted agriculture, but with an eye to the future and not parts of the past that no longer work. We wanted to draw on Bart's experiences for insight into the future of Arizona's agriculture and related sectors.

Bart makes his home in Tucson, and we began the interview just before noon to force a lunch-time break for Mexican food!

The Future of Arizona Agriculture

AREC Review. *Parts of Arizona agriculture have faced a series of difficult years, especially cotton and ranching. Looking 5–10 years into the future, how can Arizona agriculture be a viable economic sector?*

Cardon. Yes, over the last decade or two parts of our agriculture

have suffered. But, other sectors have expanded. The vegetable, dairy, durum wheat, and nursery sectors grew notably. Several traditional commodities simply do not pay because prices are so low, or because they face strong resource limitations. In those cases we must diversify by going to higher value commodities—and for crops usually ones that produce a greater value per unit of water. Agriculturalists who pay attention to using water more efficiently, to higher value crops for which there is a market, and who always ask the question 'what do I need to be doing differently to successfully farm?' will be the ones that make Arizona farming viable.

The Politics of Arizona Water Law

AREC Review. *In 1979 Governor Bruce Babbitt appointed you to a*

small committee charged with rewriting Arizona's groundwater code. Tell us a little about the politics of making water policy in Arizona.

Cardon. Prior to 1980 Arizona had a patchwork of common law and legal decisions that had plagued water users and politicians for decades. Governor Babbitt appointed about eight people to represent the cities, mines, and agriculture. Our meetings were held in secret in a Phoenix law office. Without secrecy, the press would soon force negotiators to make known positions unpopular with special interest groups—a circumstance that would put debilitating pressures on the negotiators. We met every day, seven days a week, for nearly six months. Some meetings started at one A.M. and ended at nine A.M. Or we might start at six in the afternoon and go until midnight.

Governor Babbitt presided over all the meetings to keep peace in the family. Absent Babbitt the cities quarreled with agriculture and agriculture with the mines.

Babbitt's role as peacemaker did not begin on a good note. At our first meeting he made his now famous statement: "Ladies and gentlemen, agriculture does not belong in Arizona. We are going to write this law so we drive it back to Iowa where it belongs." So I stood and picked up my materials. Babbitt asked where I was going. I said "If that's the purpose of this group, I'm not a member of it." Babbitt replied, "Wait a minute, I meant that as a joke." I said "It sure did not sound like it to me." Yet today, when we meet, Babbitt reminds me of that near fateful first encounter.

Part of my efforts to help secure water rights for agriculture rested on a particular precedent. Not long before our deliberations, Keith Waldon had won a court battle that secured rights to water for his pecan orchards south of Tucson. I rode that ruling in our debates, and in the end the GWMA secured the right of farmers to their historical levels of water use, and, with restrictions, the right to sell their land and associated water rights.

I also drew on basic economics to make my arguments. Babbitt would often say, and some people still do, "Bart, how can we afford Keith Waldon's pecan trees when it takes 8 feet of water each season to grow them." I said, "That has nothing to do with it. You can use 100 acre feet if the yields and prices are right. You need to look at the value that acre foot gives back to society, and if it's great enough, that is a good use for the water."

In the end, our committee produced a massive piece of

proposed legislation that would fundamentally change water usage in Arizona. That proposal sailed through a special session of the legislature in a little over an hour, with little discussion and few amendments. And on June 11, 1980 it became the law.

As Arizona looks to the future, my sense is that there is no way that agriculture will keep water from the city if the city wants it. In the end, cities will get the water they need, even if done outside the law. Water now going to the Ahwatucke area near Phoenix gets water from the Salt River Project, even though that area had been a desert with no water rights. No one will fight this use because so many people benefit and you can't deny the people.

Ranching in Arizona

AREC Review. *While irrigated cropland is confined to a relatively small portion of the State's vast area, ranching covers nearly its entirety. How do you see the future of ranching in Arizona?*

Cardon. The families of many of my relatives and friends pioneered ranching in Arizona. A number of years ago, ranchers fought with the public land agencies over grazing fees—Federal agencies tried to raise fees from about a dollar to over five dollars a head a month. That brought on such an outcry that the fees were reversed, and have not been raised since. In many of the last 10 years ranchers faced low calf prices, although the last couple years have been better on that score. Now they must fight with those who would bid away public lands for other uses, or with the federal land agencies that want to further restrict grazing use. Environmental groups, such as the Nature Conservancy, are very powerful

and in contrast to the earlier grazing fees confrontations, I think the environmental groups will now win most legal battles—broader interests will win over ranching families. In the last 10 years I know of only one ranching family that expanded operations. Beef cow numbers are down 50 percent from what they once were. I do not like the way ranching is headed, but a smaller range livestock presence in Arizona seems inevitable.

How the College of Agriculture and Life Sciences Can Serve Arizona

AREC Review. *The University of Arizona and its College of Agriculture and Life Sciences has served students and others for well over a century. As we adjust our course in this new 21st century, how do you see the College serving Arizona?*

Cardon. Back in 1985 the University of Arizona celebrated its centennial year. To help commemorate that occasion, the College published a handsome book on its history, and as Dean I wrote an introductory piece on the Next Century. I gave my vision of what the College should be doing as it looked to the future, and I suppose some of those ideas still hold. As a Land Grant university, The University of Arizona has a responsibility to provide not only research and education for farmers and ranchers, but to agribusiness more generally, and indeed to all members of society. Historically, our college, like other Land Grant colleges, focused its attention on production agriculture, even though production agriculture as a portion of total agriculture was declining as the agribusiness portion expanded. When that trend is coupled with the strain on the environment that is inevitable with an

New at AREC and the Cardon Endowment Program

expanding population and the technological development needed to support it, we can better understand the conflicts between many urban populations and agriculture. As we face the future, some past trends will continue. Technological developments will continue at an ever-increasing pace. Displacement of manpower by technology will continue, resulting in a further reduction of the percentage of population that can be classified as farmers and ranchers. Conversely, the same trend will increase the agribusiness segment of our society. Population will continue to grow. All this will place more strain on the environment as well as the management and use of renewable natural resources. Since this is, in a broad sense, agriculture, the challenge to the agricultural colleges is immense. Hopefully the Cardon Chair can help address some of these difficult issues. **AR**

Arizona's Ag Situation continued from page 11.

December prices at \$74.90 per Cwt, 15.6 percent above the 2001 level.

Following a year of above-average milk prices in 2001, prices plummeted in 2002. Adjustments to recent low dairy prices apparently have begun and expansion in milk production per cow has slackened. Despite these adjustments, recovery in dairy prices will be quite modest even through late 2003. The MILC program in the new Farm Bill should offer some relief to small dairy farmers, although the program itself might slow price recovery. **AR**

Satheesh Aradhya's research shows how agricultural policies affect producers and consumers. He also studies agricultural trade between the U.S. and Mexico, the role of risk in farm production decisions, and issues related to the agricultural sectors of developing countries. Satheesh teaches commodity price analysis and advanced econometrics courses at the University of Arizona.

Ayer, Harry and Alan Swinbank, "The 2002 U.S. Farm Bill: What's in it for CAP and WTO Reform?" in *EuroChoices*, Winter 2002, pp. 26-32.

Beattie, Bruce and Jorgen Mortensen, *A Story of Success! U.S. and Arizona Agricultural Productivity*, Cardon Endowment brochure, Agricultural and Resource Economics, College of Agriculture and Life Sciences, The University of Arizona, Tucson, 2002.

Mortensen, Jorgen and Bruce Beattie, *Participant Expenditures at Arizona-based Horse Shows, 2001*, Cardon Endowment report, Agricultural and Resource Economics, College of Agriculture and Life Sciences, The University of Arizona, Tucson, February 2003.

Frisvold, George and Margriet Caswell, "Financing Bilateral Water Projects on the U.S.-Mexico Border: Past Present and Future," in L. Fernandez and R. Carson (eds.), *Both Sides of the Border: Transboundary Environmental Management Issues Facing Mexico and the United States*, Kluwer Academic Publishers, 2002, pp. 131-159.

Frisvold, George and Russell Tronstad. "Economic Effects of Bt Cotton Adoption and the Impacts of Government Programs," in N. Kalaitzandonakes (ed.), *Economic and Environmental Impacts of Agbiotech: A Global Perspective*, Kluwer-Plenum Academic Publishers, 2002, pp. 261-286.

Visit the AREC web site at <http://ag.arizona.edu/arec/> for online publications, including the *2002 Arizona Field and Vegetable Crop Budgets*, *Arizona Ranchers' Management Guide*, *Cotton Newsletters*, and other publications related to the economics of Arizona's agriculture and natural resources.

The University of Arizona is an Equal Opportunity/Affirmative Action Employer in compliance with Title VII of the Civil Rights Act of 1972 and the Rehabilitation Act of 1973, the Veterans Readjustment Act of 1974, and other state and federal regulations. The University of Arizona does not discriminate on the basis of race, religion, color, national origin, sex, or handicap in its employment-related programs or activities.



Agricultural and Resource Economics
College of Agricultural and Life Sciences
The University of Arizona
PO Box 210023
Tucson, Arizona 85721-0023

NON-PROFIT ORG.
U.S. POSTAGE
PAID
TUCSON, ARIZONA
PERMIT NO. 190
