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economic perspectives on Arizona's agriculture and natural resources

THE UNIVERSITY OF ARIZONA.

Jimmye S. Hillman

An Interview

George B. Frisvold

Born and raised in rural Mississippi, Jimmye S. Hillman first joined the faculty of the Department of Agricultural and Resource Economics at the University of Arizona in 1950, serving as Head of the department from 1961 to 1990. Dr. Hillman's research interests have centered on agricultural and trade policies. His most significant work has been in the study of nontariff trade barriers. Nontariff barriers are all restrictions other than traditional tariffs or custom duties that restrict international trade. These barriers include embargoes, quarantines, quotas, and regulations for health, environmental, or sanitary purposes that are also used as trade policies. In agriculture, nontariff barriers far surpass traditional tariffs in importance. His two books *Nontariff Agricultural Trade Barriers* (1978: University of Nebraska Press) and *Technical Barriers to Agricultural Trade* (1991: Westview Press) have greatly influenced economic thinking on trade policies and remain widely cited texts. Ongoing trade disputes between the United States and the European Union over issues such as "hormone beef" and genetically modified organisms demonstrate the continued relevance of Dr. Hillman's work.

In 1966–67 Dr. Hillman served as the executive director of President Lyndon Johnson's National Advisory Commission on Food and Fiber. The Commission published *Food and Fiber for the Future* and eight companion volumes that formed the basis of many changes in U.S. farm policy in the 1970s. Among many achievements, Dr. Hillman has been President of the American Agricultural Economics Association (AAEA)

(1970–71), Senior Research Fellow, Jesus College, Oxford University (1972–73), and was named a Fellow of the AAEA in 1982.

Though retired, Dr. Hillman still remains engaged in the agricultural economics profession. He has been an active, guiding voice in the International Agricultural Trade Research Consortium. In 2000 he organized a mini-symposium on "Genetically Modified Organisms and Technical Barriers to Trade" at the 24th International Conference of Agricultural Economists in Berlin, Germany and in 2003 served as a topic editor and contributing author for the *Encyclopedia of Food and Agricultural Sciences, Engineering and Technology Resources* published by the UN Educational, Scientific, and Cultural Organization.

I had the opportunity to catch up with Jimmye this November.

Arizona Review. *Do any of the recent changes in agricultural policy surprise you?*

Hillman. No, I don't think anything is *too* surprising, whether it's controversies over GMOs (genetically modified organisms) or the WTO (World Trade Organization). You see, you have to understand the historical context of U.S. agricultural policy. Remember, the Whiskey Rebellion of 1794 was a reaction of Pennsylvania farmers to agricultural taxation. Thomas Jefferson, as



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Arizona Review Economic Perspectives on Arizona's Agriculture and Natural Resources

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Welcome

to our fourth issue of the *Arizona Review*, published biannually by the Department of Agricultural and Resource Economics (AREC) and the Bartley P. Cardon Endowment in Agricultural and Resource Economics. In this issue, Dr. Jimmye Hillman professor emeritus and former AREC Department head provides a historical perspective on U.S. farm and trade policy. Jorgen Mortensen summarizes the main findings of his recent AREC study of the contribution of agriculture to Arizona's economy. The study estimates both the direct effects of agriculture and "multiplier" effects of agriculture on other parts of the economy.

In the July 1993 issue of *Community Development Issues*, Bruce Beattie and the late Julie Leones published "Uses and Abuses of Economic Multipliers," a useful "users' guide" to multipliers. Bruce has revised and updated the article to be a companion piece to the Mortensen study. Trent Teegerstrom summarizes *Ag Help Wanted: Guidelines for Managing Agricultural Labor*, a labor management workbook he helped develop in collaboration with several extension specialists in the West. Satheesh Aradhyula and Russell Tronstad provide the *Review's* latest overview of Arizona's agricultural situation, including a discussion of regaining beef trade after BSE.

Finally, we include the program and registration information for the Arizona Agribusiness Forum 2005—Urbanization and Agriculture—to be held February 22, 2005, 9 A.M.–3:30 P.M. at the Phoenix Hilton East, Mesa, AZ (Hwy 60 and Alma School). We have an exciting group of speakers and we look forward to seeing you in Mesa.

—George Frisvold and Russell Tronstad
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ArizonaReview
economic perspectives on Arizona's agriculture and natural resources

Agriculture's Impact on the Arizona Economy

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The economic role of agriculture—farms and ranches—in the Arizona economy is considerably larger than what is revealed by a quick glance at general statistics. These statistics tell us that agriculture's share of the Arizona Gross State Product is now less than 1 percent, down from 2.5 percent 20 years ago. Yet, this measure fails to account for activity in many dependent industries that provide inputs and services to agriculture or that process and package agricultural food and fiber products. Further, agribusiness activity (primary agriculture plus the dependent supply and processing industries) brings about widespread economic ripples when agribusiness firms buy goods and services from other sectors. Beyond the *direct* activity in agribusiness and the *indirect* ripple impacts in backward-linked industries, additional economic effects are *induced* when people spend some of their income from agribusiness activities on consumer goods and services. This article provides estimates of the sum of direct, indirect, and induced economic impacts from agribusiness activity.

Agriculture affects society in a number of complex ways. Consumers purchase food and fiber products more frequently than they purchase any other type of product. Well-tended field crops and open-space scenery on cattle ranches make agriculture visible in a positive way throughout the state. In many rural communities, agriculture sustains the population and public services that would otherwise be difficult to maintain. Agriculture is often in the center of public debates about water supply and environmental questions, such as wildlife and plant habitats, use of chemical inputs in production, and disposal of animal waste. All these different impacts of agriculture—positive or negative according to the view of the observer—cannot easily be evaluated in monetary terms, and are not considered in this article. Although certainly not a complete picture, the economic impacts reported in this article provide a major base of information for the assessment of agriculture's role in the Arizona economy.

Agribusiness

Agribusiness consists of 22 sectors representing different farm types within primary agriculture. It also

includes 32 other sectors closely related to primary agriculture. Some supply agriculture with production inputs or with services. Others package and process agriculture's products. *Primary agriculture* plays a pivotal role for all agribusiness activity. It includes ranches; feedlots; dairies; other cattle farms; pig, poultry, and other livestock operations (including equine and apiculture); farms with food, fiber, seed, and feed crops; farms with tree nuts, fruit, and berries; greenhouse and nursery operations; and farms with aquaculture (fish). The selected *supply and processing* industry sectors are those that would not exist—or at least would be drastically smaller—if there were no primary farm and ranching activity in Arizona. In the present context, Arizona-based firms in the supply chain for non-Arizona farm products (e.g., potatoes) are not considered part of agribusiness. The same is true for firms that specialize in food distribution (transport, wholesale, and retail). Their activity generally depends on final demand for food and fiber products, but it is independent of the geographical origin of the basic agricultural products.

Figure 1 illustrates the high degree of specialization and division of labor among industries involved in supplying food, fiber, and other farm products. The arrows indicate the flow of goods and services in the food and fiber supply system. Recorded monetary transactions between agriculture and other industries within the agribusiness sector and between agribusiness and other sectors of the entire economy are the primary data input in the economic impact estimation model. To avoid clutter, Figure 1 is generalized. It does not show, for example, that non-agribusiness firms, which supply agribusiness with goods and services, need certain products from agribusiness to carry out their activity. The figure is a simplification that does not show many crisscrossing arrows that reflect real-life interactions.

Output, or total sales, is the only feasible measurement of transaction among individual sectors of the Arizona economy. However, it is not a good measure for a sector's own economic contribution, nor for the impacts exerted on other parts of the state economy. It gives rise to double counting because part of the total

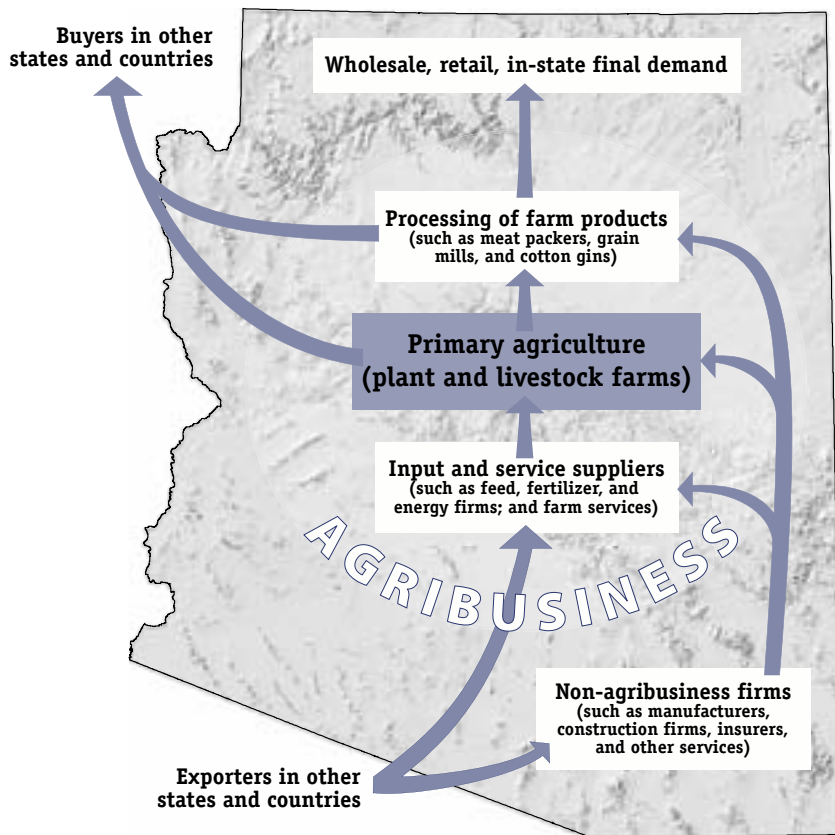


Fig. 1 Linkages among Arizona Agribusiness Firms and Other Arizona Industries

sales from one sector represents production inputs in other sectors. To avoid double counting, it is common to measure economic activity in terms of value added. Value added is total sales minus payments for all inputs and services. Gross State Product is the value-added concept used to indicate total economic activity in Arizona. So, the total economic impact of agriculture relative to the state economy as a whole is best measured in terms of value added.

Input-Output Analysis and Multipliers

The impact of agribusiness activity on Arizona's economy was estimated using a procedure known as inter-industry input-output analysis. (To find out more about the estimation methods, see More Information at the end of this article.) A feature of input-output analysis is often referred to as multiplier effects. Two main types of multipliers—Type I and Type II—are commonly identified. A Type I multiplier summarizes the direct and indirect effects noted above; a Type II multiplier, in addition to direct and indirect effects, includes the induced effect as well.

The impact analysis for Arizona agriculture was conducted using IMPLAN Professional™ Version 2.0, a computer application, and the base-year-2000 structural tables from the Minnesota IMPLAN Group (MIG). A

basic source of information for IMPLAN's 2000 Arizona tables is the comprehensive "Benchmark Input-Output Accounts for the U.S. Economy, 1997" published by the Bureau of Economic Analysis (BEA), Department of Commerce. IMPLAN generally specifies 528 individual sectors or industries based on the Standard Industrial Classification (SIC) codes. In Arizona, 460 sectors or industries come into play. The model shows how much each individual industry paid for inputs supplied by each of the other 459 Arizona industries in 2000. Arizona agribusiness includes 54 sectors. The basic IMPLAN tables reveal how much is left in each sector for labor and proprietor income, and they account for imports and exports within each commodity group. This assures that we only consider in-state economic activity.

Table 1 shows value-added and employment multipliers for selected sectors of Arizona's primary agriculture for the year 2000. For example, the Type I multiplier for dairy is 1.29. This means that for each dollar of value added directly generated by dairy farms, there is an additional, indirect value-added increase of 29 cents. Dairy's Type II multiplier is 1.84. The Type II multiplier captures both the indirect effect (29 cents) plus the induced effect (55 cents) of each dollar of value added generated by dairy farms. In the year 2000, dairy farms had a total *direct* activity of 150 million dollars value added. This generated a 126-million-dollar increase in value added in other sectors. Of this, 44 million dollars came from *indirect* effects while 82 million dollars came from *induced* effects.

The employment multipliers in Table 1 show that one job in dairy farming gives rise to 0.59 jobs in backward-linked industries, corresponding with a Type I job multiplier of 1.59. The induced employment impact adds another 0.83 of a job, so that the Type II multiplier for dairy farming is 2.42 (1.59 + 0.83 = 2.42). The industry

Table 1 Type I and II Value-Added Multipliers for Selected Farm Groups, 2000

Sector	Value-Added Multipliers		Employment Multipliers	
	Type I	Type II	Type I	Type II
Dairy	1.29	1.84	1.59	2.42
Range-fed cattle	1.57	2.27	1.43	1.79
Cattle feedlots	1.60	2.29	2.31	3.99
Cotton	1.44	1.96	2.47	3.50
Feed grains	1.29	1.72	1.40	1.83
Hay and pasture	1.33	1.79	1.17	1.34
Fruits	1.47	2.05	1.73	2.28
Vegetables	1.42	1.92	2.65	3.56

Type I multipliers capture direct and indirect effects. Type II multipliers capture direct, indirect, and induced effects.

impact as estimated by the multiplier approach only captures activity in directly and indirectly *backward-linked* sectors (sometimes referred to as “upstream” activity), but does not consider activity generated as the product (for example milk passing “downstream” through a milk bottling plant or a butter factory).

Contribution of Agribusiness to Arizona Output, Value Added, and Employment

Output from direct agribusiness activity was \$4.5 billion, with \$2.3 billion from primary agriculture and \$2.2 billion from agriculture-related sectors. Accounting for the indirect and induced effects, the total output impacts were \$6.6 billion.

However, value added—combined compensation to labor and assets—provides a more reasonable basis for assessing the agribusiness contribution to the Arizona economy. It avoids double counting by disregarding transactions that do not represent final sales but rather involve production inputs in other industries. In 2000, value added within agribusiness was 1.7 billion dollars—1.1 billion in primary agriculture and 0.6 billion dollars in the closely related supply and processing industries (figure 2). The indirect spillover to backward-linked industries was 0.5 billion dollars, corresponding with a Type I value-added multiplier of 1.32. The induced value-added impact came to 0.8 billion dollars. Agribusiness’s total value-added impact was 3 billion dollars, corresponding with an agribusiness value-added Type II multiplier of 1.81. The agribusiness impact of \$3 billion compares with a 2000 Arizona Gross State Product of about \$155 billion.

Figure 3 shows that employment generated by agribusiness activity totals 72,920 jobs (full-time and part-time) of which 47,806 are in agribusiness itself. The impact on backward-linked sectors was 8,261 jobs, while induced employment impact came to 16,853 jobs. Farming and ranching employed 20,573 persons. In other words, for every job in primary agriculture, 2.5 jobs in the rest of the Arizona economy were generated by agricultural activity. In terms of employment, the agribusiness Type I multiplier was 1.17 and the Type II was 1.53 for the year 2000. **AR**

For More Information

This article is based on “Economic Impacts from Agricultural Production in Arizona” by Jorgen Mortensen, a project completion report published by the Department of Agricultural and Resource Economics, July 2004. (Available online at <http://cals.arizona.edu/arec/pubs/econimpacts.html>)

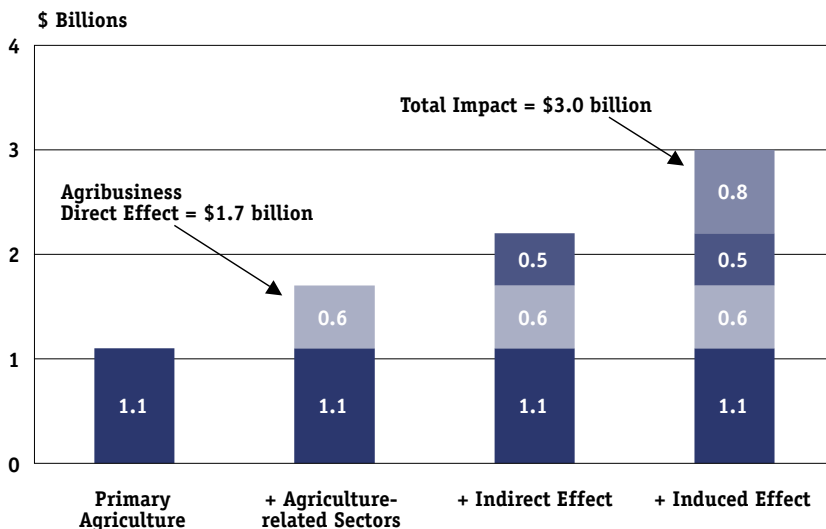


Fig. 2 Impact of Agribusiness on Value Added

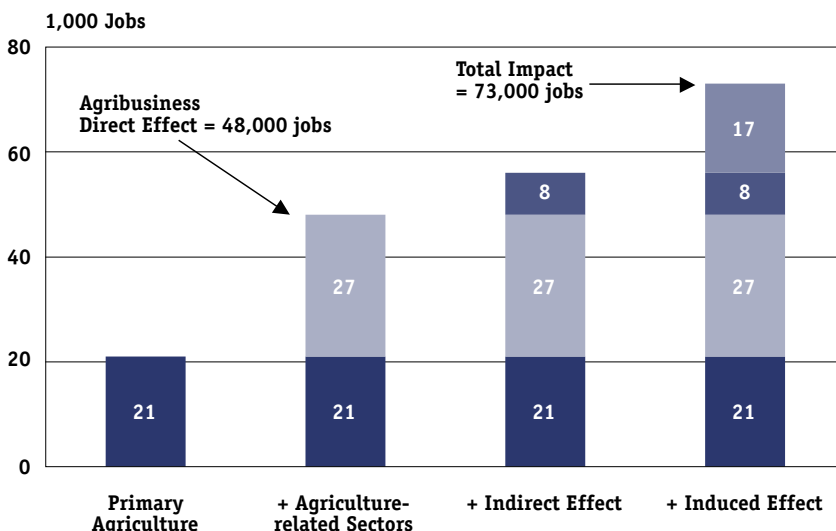


Fig. 3 Impact of Agribusiness on Employment

Acknowledgments

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Jorgen Mortensen's activities focus mainly on farm tenancy past and present, input-output impact analyses, and crop/fertilizer response research.

Uses and Abuses of Economic Multipliers

A Reprise

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Editor's note: This article is a revised and updated version of an article published by Bruce Beattie and Julie Leones in *Community Development Issues* vol. 1 no. 2, 1993. <http://ag.arizona.edu/AREC/pubs/cdnews/Vol1No2.pdf>

There are many kinds of economic multipliers. Probably the most common and of interest here are those having to do with the linkages between sectors of an economy—sometimes called input-output or *interindustry multipliers*. These multipliers are numbers (greater than one) that when multiplied times an initial impact in a particular sector or industry give an estimate of the total impact realized as that initial shock finds its way or “ripples” through related sectors of that economy.

We like the term “ripple”—it’s descriptive. We can all remember as children the pleasure of throwing rocks in a pond—especially big rocks! When the rock was big and the pond fairly small, what did we see? There was a big splash in the middle, followed by a series of waves, at first sizable and small in circumference and then getting successively smaller but larger in circumference, until finally the last little ripple struck the edge of the pond. If the pond was large or the rock small, sometimes we couldn’t see the last ripple strike the bank. So it is with economic impacts—they ripple through an economy, sometimes a large wave at first, but always giving way ultimately to a tiny ripple.

The Essence of Multipliers

An example may help us here. Suppose we’d like to know the total impact on Arizona’s economy of a 10 percent increase in electronic equipment output in Maricopa County. The initial increase in output is called the *direct effect*. Clearly an electronic equipment manufacturer does not operate in isolation. The manufacturer purchases many different inputs that go into the production of electronic equipment—energy, equipment and machinery, electronic components, etc. These input purchases give rise to a “backward-linked ripple.” Not only do electronic equipment manufacturers purchase more input from their suppliers, but these

suppliers in turn purchase a greater volume of input from their suppliers. This backward-linked impact, called the *indirect effect*, may go through several iterations depending on the extent to which sectors are interdependent and whether these backward-linked suppliers are represented in the economy of interest. It may be, for example, that the supplier of the local electronic component wholesaler is located outside of Arizona, in which case that part of the ripple would be lost to the Arizona economy. We call this *leakage*. The less comprehensive or complete our local economy, the greater will be the leakage and the smaller our multiplier.

Another component of interindustry multipliers has to do with what might be called the *consumption effect*. We like this term better than its more familiar name, *induced effect*. Employees of Maricopa County electronic equipment firms, their employees, and their backward-linked input suppliers and their employees are consumers as well as producers. Their consumption, however, depends on the income (profit or wages) they receive as business owners or employees. These people and their families are just like the rest of us. They consume groceries, movies, weekend outings, blue jeans, and what-have-you. This consumption activity contributes to the amplitude and strength of the ripple. Multipliers that take into account the consumption effect as well as the indirect effect are often labeled Type II multipliers. In contrast, a multiplier that just considers the indirect effect is called a Type I multiplier.

To complete our introduction to interindustry multipliers, we should be aware that there are a good many different kinds of such multipliers. There are income multipliers, gross receipts or output multipliers, value-added multipliers, and employment multipliers. An income multiplier tells us how much income will increase or decrease in a total economy as the income of a particular sector changes due to an increase or decrease in the output of that sector. An employment multiplier tells us how many jobs will be gained or lost in the total economy as employment of a particular sector changes due to an increase or decrease in the sector’s output. Other multipliers are interpreted similarly.

Appropriate Uses

The appropriate use of an interindustry multiplier is as a means for estimating the full impact on an economy of an increase or reduction in the final demand for particular products or services. Multipliers are also commonly used when attempting to assess the total impact of all economic activity owing to a particular sector (industry) or group of sectors (as in the preceding article by Mortensen). When used carefully multipliers can be of considerable value to policy analysts and policy makers. Unfortunately, the inappropriate uses of multipliers are numerous and all too frequent. We turn to that topic next.

Common Abuses

There are no doubt hundreds of inappropriate interpretations and ways to misuse statistics—economic multipliers are statistics (numbers) and they have been and will continue to be misused and abused. In this section we focus on eight of the most common and sometimes flagrant misuses of multipliers. Rather than be too negative, permit us to turn these abuses on their head and offer instead “some things to remember” for those of us that want to use and interpret these multipliers appropriately.

1. It’s a multiplier, not an “adder.” A common mistake, as strange as it may seem, is to apply a multiplier to a direct effect and then add the result to the direct effect to get the “total impact.” The fallacy goes something like this. Suppose our direct change is \$3 and our multiplier is 2: we multiply $\$3 \times 2 = \6 to get the “indirect effect” and then add it to the original direct effect, i.e., $\$6 + \$3 = \$9$. Right? Wrong. A multiplier is a multiplier, not an “adder”! We already accounted for the original direct effect of \$3 when we multiplied by 2. When we multiplied we got the “whole thing” (direct effect plus indirect effect), not just the indirect effect.

2. Beware of pyramid builders. Pyramiding is a seemingly irresistible way of double counting utilized by those feeling a need to show a large impact. The trick goes something like this. Let’s say that the copper mining sector has an output multiplier of 1.8. The copper refining sector has a multiplier of, say, 2.0. The copper-wire manufacturing sector has a multiplier of, say, 2.1. Oh yes, and the electric sector that supplies all three has a multiplier of, say, 1.9. So, the total impact must be 1.8 times copper mining output plus 2.0 times copper refining output plus 2.1 times copper-wire manufacturing output plus 1.9 times sales of electricity used in copper production. Pretty slick, huh? The problem, of course, is that when we calculated the multiplier for the copper-wire manufacturing sector

(if we did it correctly), we included all of the backward-linked effects (copper refining, copper mining, electrical supply) connected to the manufacture of copper wire. There are many ways to double count and pyramiding is a particularly egregious form.

3. Use the appropriate multiplier for the task. We’ve already touched on this problem. There are many different kinds of multipliers. We need to make sure we’re using the right one for the job at hand. If we’re interested in employment impacts then we obviously need to use an employment multiplier, not an income multiplier. If we’re interested in the impact on the Arizona economy then we need an Arizona-economy multiplier, not one for the U.S. economy, or one for Pinal County.

4. Turnover of dollars always exceeds the multiplier. The number of times that money changes hands in an economy has no correspondence to—and is not a good measure of—the ripple effect. An initial dollar may turn over (change hands) many times, but remember that only a part of that dollar remains in the local economy each time it changes hands. And, further, every time a dollar changes hands, a dollar’s worth of new value is not somehow magically created.

5. Distinguish between output changes and mere price changes. Incomes of cotton producers in Pinal County will go up (other things equal) if the price of cotton rises. But increases in gross receipts or income only give rise to the full economic multiplier effect when there is a change in the output of a sector. An increase in the price that producers receive for their product will have a consumption (induced) effect, but it will not affect input purchases and product produced (at least in that production year).

6. The displaced resources will not remain idle forever. When people use economic multipliers to build a case that the possible loss of a firm or industry would be large, there is often a tendency to assume that the direct loss, and the indirect loss, will be total and permanent. We know, of course, that this is not generally the case. If I lose my job, what do I do? I look for another job. Assuming I find one, it will have a positive direct effect in my new work/industry/location as well as positive indirect and consumption effects. In analyzing gains and losses (direct, indirect, and consumption/induced), we must always remember that, for most resources, unemployment is temporary. In addition, all economic sectors and employment generate indirect and consumption multiplier effects, not just the one in which we happen to work.

7. Sales within a sector may comprise a lot of the ripple. How we define sectors makes a big difference in how big or small “our sector’s” multiplier might

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political ecology at the University of Arizona's Southwest Center and a professor in the Department of Anthropology. He also directs the Hopi Documentary History Project. Formerly, he was curator of ethnohistory at the Arizona State Museum and director of ASM's Office of Ethnohistorical Research. Dr. Sheridan received his Ph.D. in anthropology from the University of Arizona in 1983. Since then he has written or edited eleven books and numerous articles concerning the political ecology and ethnohistory of the Southwest and Northern Mexico. Important works include *Los Tucsonenses: The Mexican Community of Tucson, 1854-1941* (University of Arizona Press, 1986) and *Arizona: A History* (UA Press, 1995). Dr. Sheridan also co-founded the Arizona Common Ground Roundtable, which worked to find common ground among ranchers, scientists, and environmentalists to preserve open space, biodiversity, and working ranches across Arizona.

Alvin D. Sokolow

Al Sokolow is public policy specialist, emeritus, University of California Cooperative Extension. Housed on the University of California, Davis campus, he continues to research and teach in the areas of farmland policy, community governance, public finance, and California politics. In cooperation with the American Farmland Trust, he currently is directing the National Assessment of Agricultural Easement Programs, a study of the impact and effectiveness of the agricultural easement technique. He is the co-author of a new guidebook for agricultural landowners in California on compensatory methods for conserving working landscapes. In recent years, Sokolow has researched and given numerous presentations on a wide range of farmland and land use policy topics, including public finance implications, the political roots of farmland protection, agricultural-urban edge conflicts, and optional protection techniques. Prior to joining Cooperative Extension in 1992, he was a professor of political science at UC Davis for 27 years.

John E. Thorson

John Thorson is an administrative law judge with the California Public Utilities Commission. For a decade, he was special master for Arizona's general stream adjudications. Appointed by the Arizona Supreme Court in June 1990, Thorson served as the chief judicial hearing officer in both the Gila River and Little Colorado River adjudications. He has also served as regional counsel for the Western Governors' Conference, predecessor of the Western Governors' Association. Thorson received his law degree from Boalt Hall, University of California at Berkeley and his doctorate in public administration from the University of Southern California. Thorson

has authored fifty articles on water resources law and policy, has taught environmental and water law, and has served as chair of the American Bar Association's Water Resources Committee. His remarks at this conference are his own and do not reflect the opinion of the State of California or the California Public Utilities Commission.

L. Allen Torell

L. Allen Torell is a professor at New Mexico State University and conducts research and educational programs on the economics of range livestock production and rangeland use. Major research areas include livestock cost and return studies, the economics of rangeland use and improvement, public land policy, and ranchland values. He has monitored and studied the market value of New Mexico ranches since the early 1980s when he arrived at NMSU after completing a Ph.D. at Utah State University. Dr. Torell has conducted numerous policy impact studies concerned with the potential economic impacts of altered land use policy.

Keith Wiebe

Keith Wiebe is deputy director of the Resource Economics Division of USDA's Economic Research Service (ERS) in Washington, DC. He received his B.A. in economics from Carleton College, and his M.A. and Ph.D. in agricultural economics from the University of Wisconsin-Madison. Prior to joining ERS in 1992, he was a research associate at the University of Wisconsin's Land Tenure Center. In addition to managing the Resource Economics Division's publications program, his work at ERS includes research on property rights, resource use, agricultural productivity, and food security. Dr. Wiebe recently edited the volume *Land Quality, Agricultural Productivity, and Food Security: Biophysical Processes and Economic Choices at Local, Regional, and Global Levels* published by Edward Elgar Ltd.

Mark Winkleman

Appointed state land commissioner on January 6, 2003, Mark Winkleman is responsible for managing over 9 million acres of State Trust land in Arizona. Mark brings over 21 years of commercial real estate experience to the Land Department and is a licensed real estate broker and attorney. Under Mark's leadership, the Land Department has disposed of properties through competitive auctions in an amount in excess of \$360 million dollars. The vast majority of these monies will go to benefit the State of Arizona's educational system. Mark received his J.D. from the University of Virginia School of Law and a bachelor of science degree in business and accounting from the University of Kansas, where he graduated with highest distinction.

Ag Help Wanted

A New Book on Managing Agricultural Labor

Trent Teegerstrom

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Research Specialist

Agricultural and Resource Economics

The University of Arizona

The agricultural workforce is a mix of farmers and ranchers, their family members, cooperating neighbors, and hired farmworkers working for cash wages or salary. Hired farmworkers account for over a third of all agricultural workers nationwide and are particularly important in western agriculture. According to the last *Census of Agriculture*, hired labor payroll costs averaged over \$90,000 per farm in California and Arizona, well above the national average of \$23,000. Costs in Maricopa County were even higher, at \$140,000 per farm (figure 1). In Yuma County, payroll costs per farm were \$238,000—more than 10 times the national average! In the West, 68 percent of the farm labor force is Hispanic and 58 percent are foreign born, non-U.S. citizens.

Farm business owners face complexities of employment law, labor market dynamics, and interpersonal relations, compounded by language barriers and cultural differences from their work force. Because of these challenges, many farm business owners have avoided digging into the field of labor management.

But, does it really matter how we manage labor in agriculture? What is to be gained by improving personnel practices and skills? During a recent tour of two value-added agricultural processing firms, the answers

to these questions were brought home to a group of farmers. An advisor accompanying them describes the obvious differences:

As we went through the first firm, the farmers saw that employees were busy doing their jobs, but not with a lot of energy. The atmosphere felt cold. There was very little conversation between the managers conducting the tour and the working employees, and the relationship between them seemed very formal. Owners of the firm later talked about how tough it had become to make ends meet in their business. Labor costs were too high, productivity was down, rapid staff turnover was proving disruptive in many ways, and good employees were always hard to find. They were thinking of relocating and rebuilding in another region that they believed would have a ‘friendlier’ business environment.

The tour then continued down the road a few blocks to another firm that produces a similar product for the same market. The difference was astonishing. Not only were production lines flowing smoothly, but people had an energy to them, and there was a hum about the place. It seemed the very building was alive. We heard some task-related conversations spiced with occasional laughs, and managers and employees were interacting comfortably. Owners there later talked about their recent growth, steady increases of both sales and profits, and plans for further expansion. Naturally, we all wanted to know the secret of their success. They replied without hesitation: “Our employees.”

Unlike the first firm we visited, this one had no problem finding the kind of employees it needed. In fact, well-qualified workers from other places often approached them looking for jobs, staff turnover was very low, and productivity high. The owners’ main labor concern was that some employees were accumulating a great deal of their annual vacation leave rather than taking it during the year.

These farmers caught a glimpse of what many other practitioners as well as researchers have found. Effective personnel management can be a major competitive advantage and a leading indicator of thriving business.

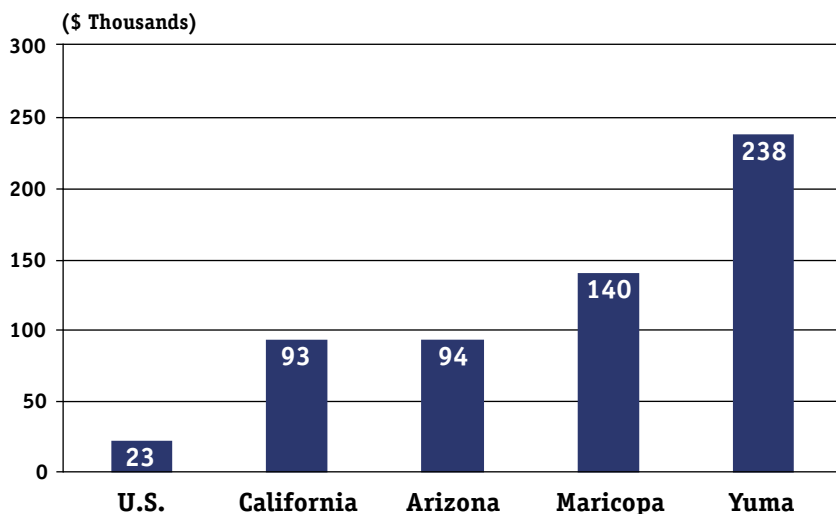


Fig. 1 Hired Labor Payroll per Farm

Competitive pressures have magnified the need for agricultural employers to operate efficiently, make good use of valuable human resources, and minimize avoidable expenses, including the costs of defending against charges of wrongdoing. Labor management affects business results, worker quality of life, commodity prices and quality, and even the social fabric of rural communities.

Who manages the agriculture labor force? More people have a hand in management than most of us realize. Their roles and titles differ across commodity sectors, region, organization size, form of business, level within an organization, and cultural background. The property owner, general manager, and human resource specialist make personnel management decisions. So do the harvest manager, ranch or crew supervisor, patrón, foreman, majordomo, lead man, crew boss, chief mechanic, jefe, office administrator, the owner's wise and deft spouse, and many production employees whose informal influence much outweighs their job titles.

The things these individuals do to manage labor cover an expanse of human activity—deciding how many people to hire, showing a daughter or son how to drive a tractor, setting wage rates, recruiting employees, writing layoff and recall policies, filling out forms upon hire, explaining pick and prune techniques, bringing water and portable toilets to the field, checking on pack quality, adjusting for family emergencies, choosing a replacement foreman, trying to cool hostilities, selecting an employee of the month, administering first aid, documenting performance strengths and weaknesses, running a meeting, and bargaining with an insurance agent. Their duties are seemingly endless.

A new book, *Ag Help Wanted: Guidelines for Managing Agricultural Labor*, provides practical guidance on a host of labor management issues for owners and managers at every level of agricultural and horticultural operations in the western United States. The book was co-written by Howard Rosenberg (University of California), Trent Teegerstrom (University of Arizona), and seven other representatives from western states and British Columbia.

As the title suggests, this handbook presents guidelines. The term “guidelines” has come to mean legal restrictions and mandates, and indeed, guidelines of the regulatory persuasion have a place here. Yet the book is not just a list of regulations. Rather, labor regulations are discussed in terms of a broader management framework. More often, the guidelines take the form of illustrative examples showing what agricultural managers are doing. The handbook begins with a few “Ideas in Practice” that managers have used successfully to

reduce labor risk or to improve operations. These brief case studies each identify a problem and objectives of a new practice, describe methods of introduction and action, and evidence of beneficial results. The book includes numerous examples throughout other chapters that describe different labor management practices. The specific, concrete examples are meant to provide points of comparison that may inspire managers to adapt them to other settings.

Other guidelines include theories and principles distilled from research or other systematic observation of management in a variety of organizations. These more conceptual guidelines provide terms for thinking and talking more analytically about everyday managerial experience. This book describes different management practices in detail. So, if readers are taken with a particular management idea, there is enough information to help them act on it.

A companion website (<http://aghelpwanted.org>) supplements the *Ag Help Wanted* text. The website provides access to a full electronic copy of the book and two kinds of supplementary resources. One is a collection of sample forms, examples, and cases within the AgHelpWanted site. The other is an organized and continually updated set of links to material available elsewhere on the World Wide Web. Some links provide articles elaborating on topics that this book simply touches on and, perhaps more significantly, many public agency pages that assist in complying with current laws and regulations.

The book does not offer any surefire prescriptions because there are none. Nor does it advise what managers “must” or “should” do. Instead, the authors seek to enable and encourage professional development—growth of managerial understanding and mindset—by adding to existing sources of usable information, knowledge, tools, and inspiration. The hope is that *Ag Help Wanted* enhances mindfulness about the decisions made in managing labor, knowledge of management practice options, and a greater understanding of the effects of alternative approaches on business operations and the personal lives of employees and family members. **AR**

For More Information

Ag Help Wanted: Guidelines for Managing Agricultural Labor: <http://aghelpwanted.org/>
Summary of Federal Laws and Regulations Affecting Agricultural Employers, 2000:
<http://www.ers.usda.gov/Publications/ah719/>

Trent Teegerstrom's work focuses around production economics for all commodities with a special interest in agricultural labor, farm/ranch finance, new technology adoption, and risk management.

Jimmy S. Hillman continued from page 1.

U.S. ambassador to France, saw the beginnings of the French Revolution up close and promoted a notion of “agrarian equity” as president. The concept of a federal “agricultural policy” evolved from a notion of equity and justice for rural populations—as a means of giving them a more equitable stake in the system.

Arizona Review. *But we didn't have what most people would recognize as modern agricultural policy back then.*

Hillman. Yes, but agriculture was affected by land policy, monetary policy, tariff policies, transportation policies, rural settlement, and development policies. Agricultural trade and tariffs were where all the action was. Every administration since George Washington's had a tariff policy. The customs duty on imports was the largest source of revenue for the federal government up to about 1900.

Arizona Review. *Let's jump ahead to the 1920s and '30s.*

Hillman. Chemical agriculture was just budding in the 1920s. There had been earlier innovations in mechanization and the United States had become a big exporter. We supplied Europe with agricultural commodities during World War I. The focus then was on all-out production. Farmers wanted two things: increased production and high prices.

Arizona Review. *That's a bit of a contradiction, isn't it? Increased production leads to lower prices.*

Hillman. (Chuckles) Why yes... but farmers didn't realize the contradiction. There had been some shift in thinking. Some language introduced in legislation began to focus on “marketing” and “utilization”—but bills to stabilize farm prices were vetoed by Coolidge and Hoover. It wasn't until the Great Depression that there was finally

acceptance that something had to be done about “overproduction.” Then, the question was how do you control output? There were 6.5 million farmers in 1933. Who gets to produce? How much could be produced in each state, each county, by each farmer?

Arizona Review. *How did production control work?*

Hillman. Farmers were given allotments to produce based on their historical acreage. The guys who kept the farm programs honest were the farmers themselves. You had production control but the programs were democratically administered. There was also the question of what to do about imports. Section 22 of the Agricultural Act of 1935 allowed the president to limit import of farm commodities such as wheat, cotton, and sugar so that U.S. market prices would not fall below government support prices. The boom in U.S. farm exports with World War II helped farmers and the programs were definitely favorable to the efficient ones. They were at least surviving. Having agricultural reserves also helped win the war. After World War II, prices began to fall again. Here's where Willard Cochrane's *American Farm Policy, 1948–1973* is essential reading to understand post-World War II policy. Without wartime controls, there were only controls on acreage. Legislation was introduced to limit use of other inputs and to limit production directly, but this was never adopted. As a result of acreage limits, productive acres became “high value” and land prices went through the roof. You also saw food programs—such as school lunch programs, domestic food stamp programs, and foreign food aid—to utilize supplies of farm commodities. So, that's the genesis of modern agricultural policy. After Nixon, agricultural policy ceased to be a national issue. As a share of

the federal budget, farm programs have fallen steadily since the 1960s.

Arizona Review. *Don't presidents now defer a lot to the House and Senate Agricultural Committees?*

Hillman. Yes, and the Senate is particularly important. Each state has two senators and this gives significant power to agriculture. Take sugar for example. We currently have import controls that keep the U.S. price of sugar at more than double its world price. How can this be? You have cane and beet sugar produced across a number of states. In addition, high sugar prices help the sale of high fructose corn syrup as a sweetener, so senators in sugar-producing states have allies in corn-producing states. So, about 30 senators have a stake in protecting sugar.

Arizona Review. *Developing countries are pressing for reductions in farm support in industrialized countries and greater access to our markets. What do you think will happen in the new agricultural negotiations of the WTO?*

Hillman. My feeling is that the United States will be politically induced to go along with the developing countries somewhat. National economies are more globally integrated. We can't divorce our own domestic agricultural policy decisions from the rest of the world. I see no way out except by working through the WTO. This goes back to the equity question I spoke of before. Currently, we can produce enough for everyone on the planet to have adequate food and fiber. So, we come back full circle to the question of who has a right to produce commodities. How much do people have a right to consume? This is why I said that if you have a historical perspective, recent developments don't seem all that surprising. Before we had the WTO, the GATT (General Agreement on Trade and Tariffs) prevailed for some

55 years. People don't realize that the GATT was a legal and regulatory body, not an economic body. Other organizations did the economic analysis external to GATT bodies themselves. I don't see economists and economics as actively shaping trade policy as they were or could be.

Arizona Review. Aside from participating more actively in trade policy discussions, what advice would you give to young agricultural economists?

Hillman. You have to keep abreast of world events and world views. It's obvious that people think differently. You can't dismiss differences. You have to try and understand them. I keep abreast of events by reading the *New York Times*, the *International Herald Tribune*, and

the *Manchester Guardian* among other sources. You need to try and understand changes in the distribution of wealth and ownership.

Those relationships are becoming more complex. There are still only two sides to markets, supply and demand, in other words, production and consumption. But agriculture has become more concentrated. It's a different world than 50 years ago. Before, much of agricultural policy dealt with individuals. Now you have to understand the workings of large trading and input supply companies. I'd also say that no matter what issue you pursue, you need to be as prepared as you can be. You need to know math and statistics, but you also need to know the facts of an issue.

Arizona Review. What do you see as "unfinished business" in agricultural policy, or public policy in general?

Hillman. I think we've been led to believe that free markets and individualism alone can save the world. The farm crisis of the 1930s demonstrated that people couldn't survive if they just tried to go their own way. They had to cooperate with government and with each other. If you didn't do that in the '30s, you didn't survive. We've made an enemy out of cooperation. The policy question we need to be asking is how do we make decisions for the collective benefit? Individual outcomes are not the ultimate solution. Policy has to be concerned with the question of how to build a community. **AR**

Economic Multipliers continued from page 7.

be. For example, it is likely that the multipliers for the dairy sector of most economies will be larger than for the agricultural sector as a whole. Why? When we are looking at the dairy sector, purchases from other agricultural sectors are appropriate to count as indirect effects, e.g., the purchase of alfalfa hay from a neighboring farm. But when we think of agriculture in total as a sector, this purchase would be considered part of the direct effect, and thus would not be appropriate to claim as part of the interindustry ripple effect. Impacts should be counted only once—either as part of the direct or the indirect effect.

8. Watch out for comparisons of apples and oranges. Another more subtle abuse of multipliers comes into play when someone wants to compare total impacts to something else in the economy. For example, a convenient (and often relevant) state-level economic figure is gross state product. This figure is similar to value added in that it represents returns to primary inputs such as labor, land, and capital in the region. It can be thought of as net receipts (receipts minus the cost of intermediate inputs). It is tempting (and unfortunately, commonplace) to compare a total output

value of a sector to the gross state product to find out how "big or important" the subject sector is in relative terms. The problem is that output is a *gross* receipts figure. When you compare gross receipts plus indirect impacts of one sector to the net receipts for the entire economy, the one sector looks as though it is bigger than it truly is. There aren't any easy rules for detecting misuses in this area. However, do ask yourself, are we comparing equivalent figures? Did the figures come from the same data source and are they consistent?

We trust this article has increased your understanding of economic impact analysis, and we hope that you will be a discriminating and critical user (not abuser) of economic impact analysis results. **AR**

Bruce Beattie has broad research and outreach interests in agricultural economics, including production economics, the importance of agriculture in regional and national economies, and the role of markets in fostering economic well being. He is a past president of the Western Agricultural Economics Association, the American Agricultural Economics Association, and the National Association of Agricultural Economics Administrators. Bruce enjoys teaching freshman-level principles of economics and production economics theory for beginning graduate students.

Arizona's Agricultural Situation

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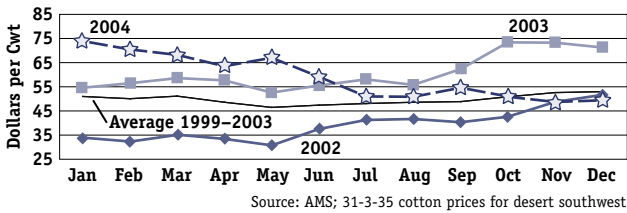
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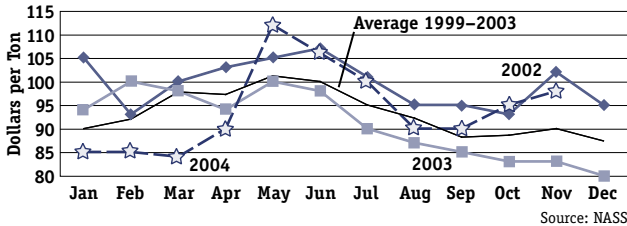
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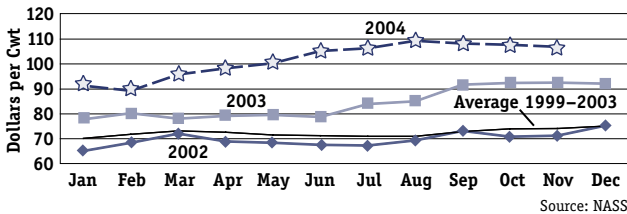
Arizona Upland Cotton Prices



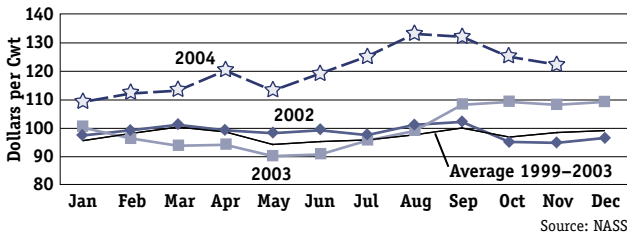
Arizona Alfalfa Prices



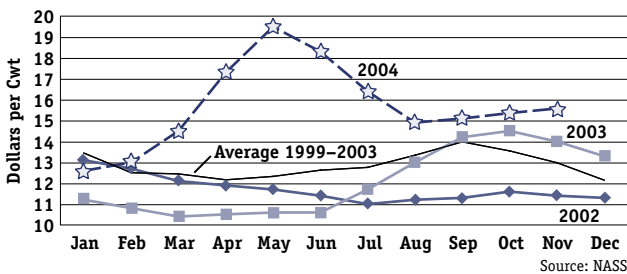
Arizona Slaughter Steer and Heifer Prices



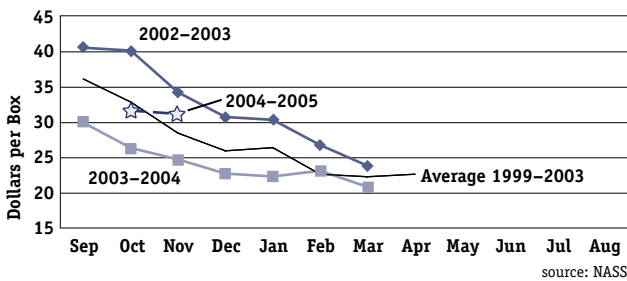
Arizona Calf Prices



Arizona Milk Prices



Arizona Lemon Prices



According to the U.S. Department of Agriculture's (USDA) December forecast, U.S. production of upland cotton is projected at 22.8 million bales, up nearly 24 percent from last season. Excellent growing conditions throughout most of the cotton belt this season coupled with a 9.7 percent increase in area harvested have led to higher production forecasts. Upland cotton yield in Arizona is expected to be 1,342 pounds/acre, 8.3 percent above 2003. Only California is expected to have a higher upland cotton yield at 1,508 pound/acre. Arizona's upland cotton area harvested for 2004 is expected to grow by 10.8 percent to 236,000 acres. As a result, Arizona's upland cotton production is expected to increase by 20 percent to 660,000 bales.

While U.S. mill use of cotton has been declining over the past several years, cotton consumption in various foreign countries, particularly China, has seen significant increases. The latest USDA projections for 2004/05 show that foreign cotton usage is forecast at a record 97.1 million bales. However, surges in both domestic and foreign cotton production in 2004/05 have been exerting downward pressure on cotton prices and after two years of rising prices, U.S. and Arizona cotton prices have steadily declined during most of 2004.

The structure of the global textile market is fundamentally changing in response to policy reforms stemming from the 1995 Uruguay Round (UR) of the World Trade Organization with implications for domestic cotton producers (Amber Waves, September 2004, available at www.ers.usda.gov/Amberwaves/September04/DataFeature/). The UR instituted agreements to reduce tariffs on textiles and apparel products and to eliminate all bilateral import quotas sanctioned under the 1974 Multi-Fiber Arrangement by 2005. These reforms should stimulate growth in textile trade, significantly alter the location of textile and apparel production, and possibly change the direction of fiber and textile trade. The UR reforms are expected to increase incomes for textile-producing countries and reduce U.S. and world prices for textiles and apparel, increasing worldwide demand for cotton and other products in the supply chain. Nationally, 2004 has been a record year for the dairy industry. Domestic milk production is at or near record high, commercial use is at its peak, and nominal milk prices, albeit with very high volatility, have hit new highs. Arizona dairy markets have also shown a similar pattern for 2004. After attaining a record high level of \$19.5/cwt, Arizona milk prices have since decreased and appear to

have stabilized around \$15.5/cwt by year's end. USDA projects milk production in 2005 to modestly expand and prices to stabilize.

According to the Arizona Agricultural Statistics Service, Arizona farmers are expected to harvest 1.920 million tons of alfalfa hay on 240,000 acres in 2004, a 3.9 percent decrease in production and a 2.1 percent increase in area. After below average prices in the first quarter of 2004, alfalfa prices have since been above 1999–2003 average levels for most months.

Although lemon production is expected to increase nationally by about 4 percent in 2004–2005, USDA expects Arizona lemon production to decrease by as much as 600,000 boxes, a 20 percent decline. California, the major lemon-producing state, experienced a similar precipitous drop in production last year while Arizona held her production stable at 3 million boxes in 2003–2004. Arizona lemon prices for 2004–2005 are expected to be near 1999–2003 average levels.

Regaining Beef Trade

On October 23, 2004, the governments of Japan and the United States issued a joint statement for a process to begin the resumption of beef trade since a single cow of Canadian origin in the state of Washington tested positive for BSE or "mad cow" disease. The terms of the trade resumption agreement constitute the Beef Export Verification (BEV) program. A few days later Korea announced that it would also like to re-establish beef trade on similar terms. Key points of contention for the resumption of trade have been BSE testing, age verification, and acceptable age of animals for exports. BEV prohibits exporting meat from animals older than 21 months of age. Another key requirement is that beef products have no specified risk materials

such as spinal cords, bovine heads (except for tongues and cheek meat), and vertebral columns.

The current focus of the BEV program is to establish appropriate criteria for determining animals that are less than 21 months of age. Age verification can be through either 1) individual animal age verification, 2) group age verification, 3) insemination age verification, or 4) the USDA process verified animal identification and data collection services. The latter requirement is receiving all the attention because it allows for age verification to be based upon examination of the carcass. Given that the supply of U.S. beef cattle with documented age proof is rather limited, an acceptable carcass-based age verification system is important for the United States to re-establish a presence in Asia's beef markets.

What does opening the door to Asia's beef export market mean for U.S. producers? The loss in export market sales from BSE has been estimated to have reduced U.S.-fed cattle prices by \$6–\$10 per hundredweight. But how much and when will lost export market shares be regained is the most critical question. Procedures and requirements are in place for some beef exports to begin as early as January, though many feel that it will be this summer before we see any significant product movement to Japan. Another hurdle that may be more insurmountable than trade regulations is foreign competition. Japanese retailers have been working closely with beef suppliers in Australia, New Zealand, and Mexico. Australia currently supplies 90 percent of the beef imported by Japan and their feedlot inventories have swelled in the last 10 months. Increased shipments from Australia to Japan already equal 43 percent of the void created by the halt in U.S. beef exports to Japan. Thus, only a

little more than half of our pre-BSE beef export markets appear "readily available for the taking." Australia has never reported a BSE case and their less intense feeding systems are believed to be less conducive to BSE problems by the Japanese.

In addition, a Japanese newspaper (ASAHI) conducted a public-opinion poll and found that 63 percent of Japan's consumers were not interested in eating U.S. beef once trade resumes and only 26 percent supported reopening trade flows without BSE tests for animals younger than 21 months. Hence, Japanese buyers may prefer to procure more beef supplies from Australia. U.S. pork exports have been up 24 percent this year as well, although the growth to Japan has only been up 6 percent while exports to Mexico are up 70 percent.

Winning over the Japanese consumer will likely be the bigger hurdle to regaining market share in Asia than overcoming trade requirements. The brightest part of the BSE situation for the United States is that domestic consumers have not missed a beat with their beef consumption. As a result, Arizona prices for steers and heifers and calves have been well above average for the year 2004 and are expected to remain strong in 2005. **AR**

Satheesh Aradhyula's research shows how agricultural policies affect producers and consumers.

Russell Tronstad's research and extension activities focus on marketing, management, and policy issues germane to Arizona's production agriculture.

New at AREC

Brookshire, David S., Bonnie Colby, Bonnie, Mary Ewers, and Philip T. Ganderton. 2004, "Market Prices for Water in the Semiarid West of the United States." *Water Resources Research* 40.

Colby, Bonnie. "Tribal Water Settlements in Arizona." In *Arizona's Water Future: Challenges and Opportunities*, 85th Arizona Town Hall Background Report prepared by The University of Arizona. pp. 115-124. 2004. Available online at <http://ag.arizona.edu/AZWATER/publications/townhall/Chapter8.pdf>

Frisvold, George. 2004, "How Federal Farm Programs Affect Water Use, Quality, and Allocation among Sectors, *Water Resources Research* 40.

Jacobs, Kathy and Sharon Megdal. "Water Management in the Active Management Areas." In *Arizona's Water Future: Challenges and Opportunities*, 85th Arizona Town Hall Background Report prepared by The University of Arizona. pp. 71-94. 2004. Available online at <http://ag.arizona.edu/AZWATER/publications/townhall/Chapter6.pdf>

Jacobs, Kathy and Sharon Megdal. "Water Supply and Management Beyond the Active Management Areas." In *Arizona's Water Future: Challenges and Opportunities*, 85th Arizona Town Hall Background Report prepared by The University of Arizona. pp. 95-113. 2004. Available online at <http://ag.arizona.edu/AZWATER/publications/townhall/Chapter7.pdf>

Jacobs, Kathy, Sharon Megdal and Marshall A. Worden. "Questions of Water, Growth and Policy." In *Arizona's Water Future: Challenges and Opportunities*, 85th Arizona Town Hall Background Report prepared by The University of Arizona. pp. 147-150. 2004. Available online at <http://ag.arizona.edu/AZWATER/publications/townhall/Chapter11.pdf>

Megdal, Sharon. "Public Policy Review," a regular column on water policy issues in *Arizona Water Resource*, the bi-monthly newsletter of the Water Resources Research Center, University of Arizona, available online at <http://www.ag.arizona.edu/AZWATER/awr/awrmain.html>

Orr, Patricia and Bonnie Colby. 2004, Groundwater Management Institutions to Protect Riparian Habitat, *Water Resources Research* 40, in press.

Tronstad, Russell. "Challenges of Animal Identification in the West." U.S. Livestock Identification Systems: Risk Management and Market Opportunities, Western Extension Marketing Committee, D. Bailey and W. Umberger (managing editors), October 2004. Available online at <http://www.lmic.info>.

Tronstad, Russell, Trent Teegerstrom, and Daniel Osgood. "The Role of Electronic Technologies for Reaching Underserved Audiences." *American Journal of Agricultural Economics*, Vol. 86(3), August 2004:767-771.

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