



UNIVERSITY of CALIFORNIA

# Agriculture & Natural Resources



COOPERATIVE EXTENSION • SOLANO COUNTY  
501 Texas Street, Fairfield, CA 94533 Tel. (707) 421-6790 Fax (707) 429-5532

## *The Economic Impact of Solano County's Agricultural Industry December 2003*

Dr. Christina Getz, Cooperative Extension Specialist, Department of Resource Economics, UC Berkeley  
Lawrence Clement, County Director, UC Cooperative Extension, Solano County  
Susan Cohen, Agricultural Commissioner, Solano County  
Diane L. Metz, Nutrition, Family & Consumer Science Advisor, UC Cooperative Extension, Solano County

Agriculture adds value to the local economy in a number of ways. This brief report provides insight into the aspects of these economic spin-offs. Agriculture takes place on 64% of the land in Solano County, of which half is irrigated agriculture. The remainder is devoted to dry-land farming (e.g. Montezuma Hills) and grazing/pasture lands throughout the county. The total acreage of Solano County is 530,188 acres. In 2002, 344,107 acres were devoted to farming and ranching. Major crops in Solano County are nursery stock, processing tomatoes, cattle and calves, alfalfa, wine grapes, feeder lambs, irrigated wheat, walnuts, field corn and milk. Solano County ranks as one of the top five counties in California for production of sheep and lambs, corn (grain), grain hay, and Sudan hay. The 2002 gross value of agricultural production was the third highest in Solano County with a total of \$199,485,500. This figure represents a 7.4% increase over 2001. Agriculture continues to have a significant influence on the local economy.

The production of agricultural commodities, both raw and processed, generates an important and significant amount of economic activity in Solano County. To quantify the impact of Solano County's agricultural and agricultural processing sectors on economic activity in the county, we collaborated with UC agricultural economists,<sup>1</sup> who used a software program called IMPLAN to estimate the spin-off effects of agriculture on the county's economy as a whole. IMPLAN uses county-level employment in combination with nationally derived industry-level output averages to estimate county-level output averages. This model is based on the assumption that Solano county output averages are the same as national averages. In actuality, Solano County's agricultural production of unprocessed commodities is more efficient (in terms of output/unit of employment) than the nation as a whole.

Using IMPLAN, we estimated the value of Solano County's agricultural industry output, including both agricultural commodity and processing sectors, at \$668.5 million. This amount is equivalent to 4.2 % of Solano's estimated \$ 15.8 billion in output. While we often think in terms of output as a measure of economic activity, a more useful measure is value added, which represents the amount an industry or economic sector contributes to the economy in terms of payments to capital, labor, and other forms of income. Solano County's food industry contributed \$257.2 million in value added products, or 2.8% of Solano County's \$9.1 billion in value added products and services.

<sup>1</sup> Many thanks to Dr. Peter Berck and Ryan Kellogg for their invaluable assistance with this project.



Table 1 summarizes the direct contributions of Solano County's food industry to the county as a whole. The overall direct economic contribution is estimated at \$668.5 million and directly provides for almost 4,200 jobs. An additional \$257.2 million is provided to the economy as value added to the products produced through processing, marketing, distribution and handling.

Table 1. Direct value of Solano County agricultural production to county-wide economy.

Economic Measure	Direct Value
Output	\$668.5 million
Value Added	\$257.2 million
Employment	4,187 jobs (production and processing)

Solano County's food industry is not monolithic, and as such can be further broken down into commodity groups. Table 2 breaks down the food industry into six major commodity groups, and further breaks down each group into unprocessed and processed. It shows the *direct* effect of agriculture through estimated output (in millions), employment, personal income (employee compensation + proprietor income), and total value added (personal income + other property income + indirect business taxes).

Table 2. Estimated economic value of Solano County agriculture by commodity groups.

Major commodity groups	Estimated Output (\$)	Direct Employment (# Jobs)	Direct Personal Income* (\$)	Total Value Added** (\$)
<b>Dairy/Poultry Farm Products and Dairy Processing</b>	<b>68,217,000</b>	<b>282</b>	<b>15,659,000</b>	<b>23,083</b>
Raw Product	5,672,000	32	2,006,000	2,372,000
Processed Product	62,545,000	250	13,653,000	20,711,000
<b>Livestock and Meat Packing</b>	<b>108,593,000</b>	<b>736</b>	<b>15,376,000</b>	<b>19,265,000</b>
Raw Product	19,847,000	508	6,156,000	7,911,000
Processed Product	88,746,000	228	9,220,000	11,354,000
<b>Food/Feed Grains, Hay, and Flour/Grain Mill Products</b>	<b>96,089,000</b>	<b>858</b>	<b>21,249,000</b>	<b>32,585,000</b>
Raw Product	19,719,000	594	5,939,000	11,863,000
Processed Product	76,370,000	264	15,310,000	20,722,000
<b>Fruits, Nuts, Vegetables and Processed Product Fruits/Vegetables</b>	<b>261,668,000</b>	<b>1,666</b>	<b>76,562,000</b>	<b>129,904,000</b>
Raw Product	122,276,000	1221	49,112,000	74,297,000
Processed Product	139,392,000	445	27,450,000	55,607,000
<b>Sugar/Misc. Crops and Confectionery Products</b>	<b>125,219,000</b>	<b>538</b>	<b>19,299,000</b>	<b>46,634,000</b>
Raw Product	6,706,000	127	1,720,000	4,124,000
Processed Product	118,513,000	411	17,579,000	42,510,000
<b>Greenhouse/Nursery Products</b>	<b>8,714,000</b>	<b>107</b>	<b>3,707,000</b>	<b>5,731,000</b>
Raw Product	8,714,000	107	3,707,000	5,731,000
Processed Product				
<b>TOTAL</b>	<b>\$668,500,000</b>	<b>4,187</b>	<b>\$151,852,000</b>	<b>\$257,202,000</b>
<b>Total Raw Product</b>	<b>\$182,934,000</b>	<b>2,589</b>	<b>\$68,640,000</b>	<b>\$106,298,000</b>
<b>Total Processed Product</b>	<b>\$485,566,000</b>	<b>1,598</b>	<b>\$83,212,000</b>	<b>\$150,904,000</b>

\* Personal income = Employee Compensation + Proprietor Income

\*\* Total Value Added = Personal Income + Other Property Income + Indirect Business tax



## MULTIPLIERS/INDIRECT EFFECTS – AGRICULTURE AND THE FOOD PRODUCTION INDUSTRY

Not only does a food sector promote *direct* effects on the economy; it also stimulates the economy *indirectly*, creating *multiplier effects* that ripple through the economy. We can understand this concept conceptually in a number of ways. First of all, if we think about *employment multipliers*, if an industry adds one more job, this will create other jobs in the county as the industry buys more inputs and as increased income generates increased spending in the county. Secondly, if we think in terms of *output multipliers*, if an industry exports \$1 more product out of Solano County, this economic activity will indirectly generate output in other sectors of the economy. And finally, in terms of *value added multipliers*, for every \$1 spent by an industry on payments to capital and labor, these input sectors will be stimulated and the increased income by labor and capital will stimulate the economy.

Table 3. The impact of applying the multipliers to generate the *indirect* effects of all agricultural sectors on Solano County as a whole, including multiplier values.

Economic Measure	Direct Effect	Direct + Indirect Effect
<b>Output</b>	\$668,500,000	\$1,270,700,000
<b>Value Added</b>	\$257,200,000	\$581,200,000
<b>Employment (Processing/Production)</b>	4,187 jobs	10,077 jobs

From Table 3 above, we can see that the spin-off effects of agricultural and agricultural processing sectors in Solano County are quite large. Whereas direct sales are estimated at \$668.5 million, when the output multiplier is taken into account, sales stimulated by agriculture rise to \$1.2707 billion, almost double. Similarly, whereas total value added from agriculture (more easily conceptualized as the economic activity stimulated by agriculture in the County) is estimated at \$257.2 million, when we take into account the value added multiplier, value added rises to \$581.2 million. And, using the employment multiplier, we see that the total number of jobs stimulated by agriculture in the county, more than doubles to 10,077.

Table 4 below details the effect of the multipliers on Solano County’s six major agricultural commodity groups with respect to value added, direct sales, and employment, both direct and indirect.

Table 4. Effects of multipliers on major commodities.

Major Commodities	Value Added Multiplier	Direct + Indirect Value Added	Output Multiplier	Direct + Indirect Output	Employment Multiplier	Direct + Indirect Employment
<b>Dairy/Poultry Products/Processing</b>	2.46	\$56,756,242	1.89	\$128,649,963	3.07	867 jobs
<b>Livestock/Meat Packing</b>	3.92	\$75,474,702	2.17	\$235,855,634	2.57	1,889 jobs
<b>Food/Feed Grains, Hay, Flour/Mill Products</b>	2.59	\$84,416,493	1.93	\$185,207,127	2.07	1,777 jobs
<b>Fruit, Nuts, Vegetables &amp; Processed Fruits/Veg</b>	1.89	\$245,912,589	1.81	\$473,174,768	2.24	3,726 jobs
<b>Sugar/Misc. Crops/Confectionery Products</b>	2.34	\$109,087,605	1.86	\$232,596,421	3.05	1,644 jobs
<b>Greenhouse/Nursery</b>	1.66	\$9,528,498	1.75	\$15,234,625	1.63	174 jobs
<b>Totals</b>		<b>\$581,176,229</b>		<b>\$1,270,718,539</b>		<b>10,077 jobs</b>



**Summary:** The data indicates that the overall economy of agricultural production in Solano County remains a viable component of the counties overall economic condition with a gross output value approaching \$1.3 billion. Agriculture also provides 4,187 jobs directly employed on the farms plus and additional 5,890 jobs indirectly through the multiplier effect. Additional inputs into infrastructure, processing and handling of raw product and supporting industries can increase the overall output significantly.

**Definitions:**

IMPLAN is a software program that converts national data into state-level data. It uses county-level employment data (from the Employment Development Department) and nationally derived industry-level output averages (from the US Survey of Manufacturing) (output averages = unit of output per unit of employment) to estimate county-level output averages.

**HOW THIS DATA WAS DERIVED AND GLOSSARY OF TERMS:**

- **SOCIAL ACCOUNTING MATRIX (SAM)**  
We used IMPLAN to produce a social accounting matrix (SAM) for Solano County. A social accounting matrix is an accounting systems of an economy expressed in a matrix form. A SAM is basically a snapshot of the transactions in an economy during a specified time period.
- **MULTIPLIERS** (examples for the Solano dairy industry). Economic activity multipliers were generated using the Solano County SAM
  - **Total Value Added Multipliers:** For dairy, \$1 spent by the dairy industry leads to \$2.25 total value-added change over the entire economy (including the \$1 value-added generated within the dairy industry). In other words, if the dairy industry spends an extra \$1 by increasing its inputs AND by increasing payments to its factors (capital and labor), the effect will be a stimulation of the entire economy-such that \$2.25 in total value-added will be achieved.
  - **Value-added** is the value of capital and labor added to raw materials. Processed goods are going to have higher “value added” because more capital and labor have been added to the raw commodity. Value-added is important because it represents the economic activity in the county.
  - **Output Multipliers:** One more \$1 of output (exported out of the county) in an industry will lead to \$1.38 more in the county as a whole (this includes the extra \$1 in dairy).
  - **Employment Multipliers:** One more job in dairy will lead to 1.94 jobs in the county as a whole (including the one job in dairy).

