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A Brief Look at the Arizona Dairy Industry

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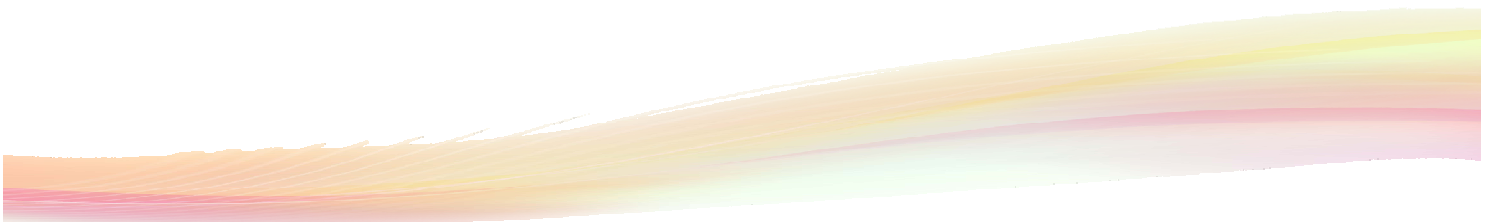
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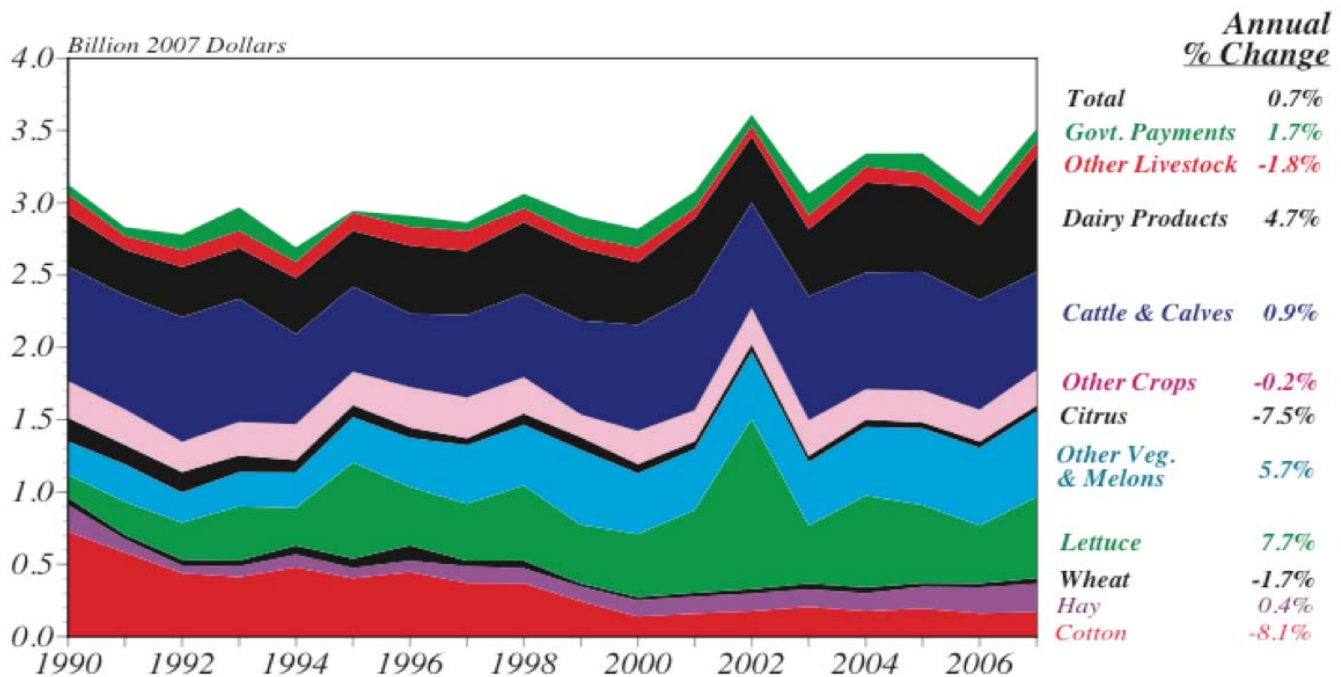


A Brief Outline of the Arizona Dairy Industry

The purpose of this report is to give the reader a brief overview of the Arizona Agriculture industry along with some general trends and economic information about the Arizona dairy industry. This report should by no means be considered a complete analysis of the Arizona dairy industry but the reader should gain some insight into the basic structure of the industry. Figure 1 shows the changes in the Arizona Agricultural Revenues between 1990 and 2008. During this period, market sales and government payments to Arizona's agriculture show some growth, (0.7% per year), after accounting for inflation. Lettuce, other vegetables and melons, and dairy products have had the largest percentage gains over this period while cotton and citrus have declined the most. Lettuce has replaced cotton as the crop with the highest total sales value, due to the expanded production of winter lettuce in Yuma. Dairy products also showed a significant annual growth, 4.7% per year.

Figure 1.

Sources of Arizona's Ag. Revenues



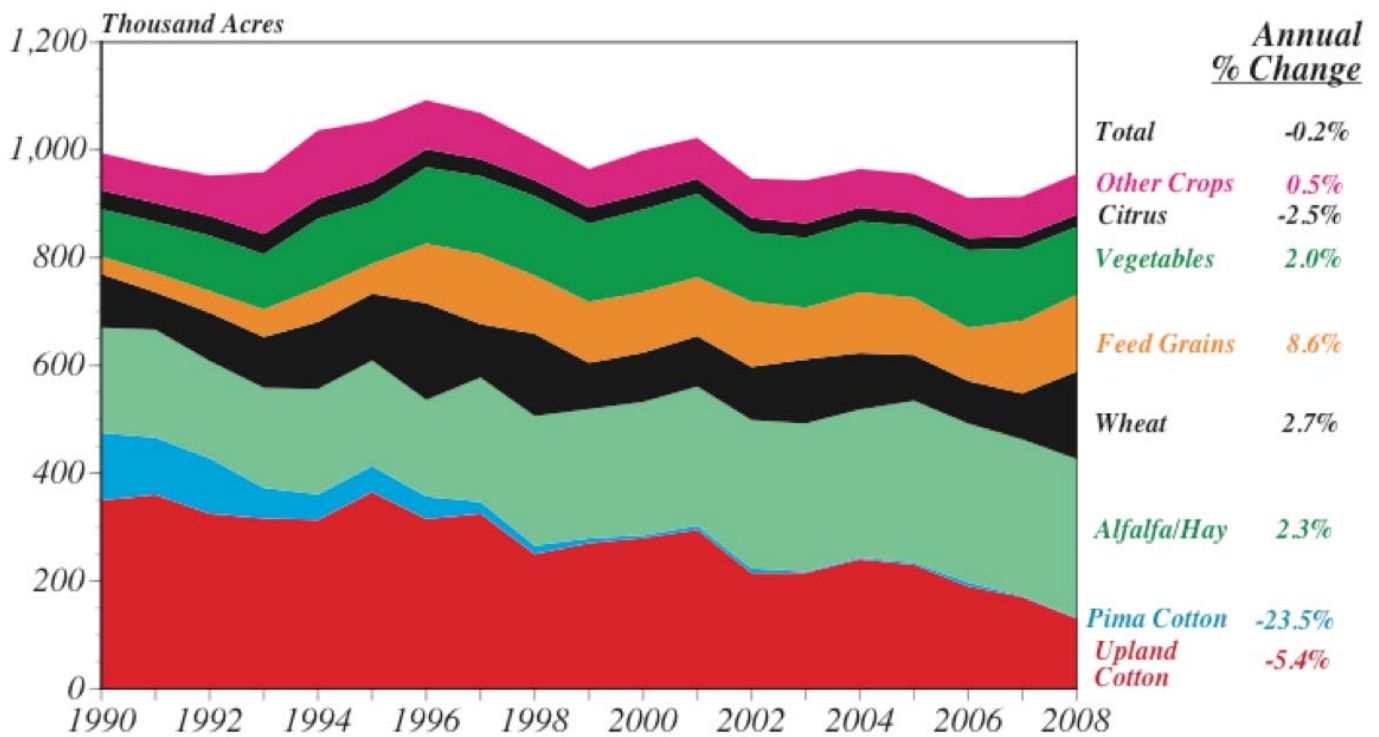
Source: Arizona Agricultural Statistics, various years

Note: Revenues are deflated by the Consumer Price Index for all goods, 2007 dollars

Over the same periods of 1990 to 2008, Figure 2 shows that the Arizona's total crop acreage has been fairly stable since 1990 around 1 million acres. However, cotton acreage has declined from 475,000 to 131,000 over this period. Pima cotton has almost totally disappeared from Arizona with almost all production shifting to the San Joaquin Valley. During this period, alfalfa acreage has increased by 100,000 acres or 51% going from 195 to 295 thousand acres. Feed grain acreage increased by an annual increase of 8.6%. The increase has helped service our growing dairy industry and population. Vegetable acreage has increased from 88 to 126 thousand acres from 1990 to 2008, reflecting the growth in leafy vegetables during the winter season in Yuma.

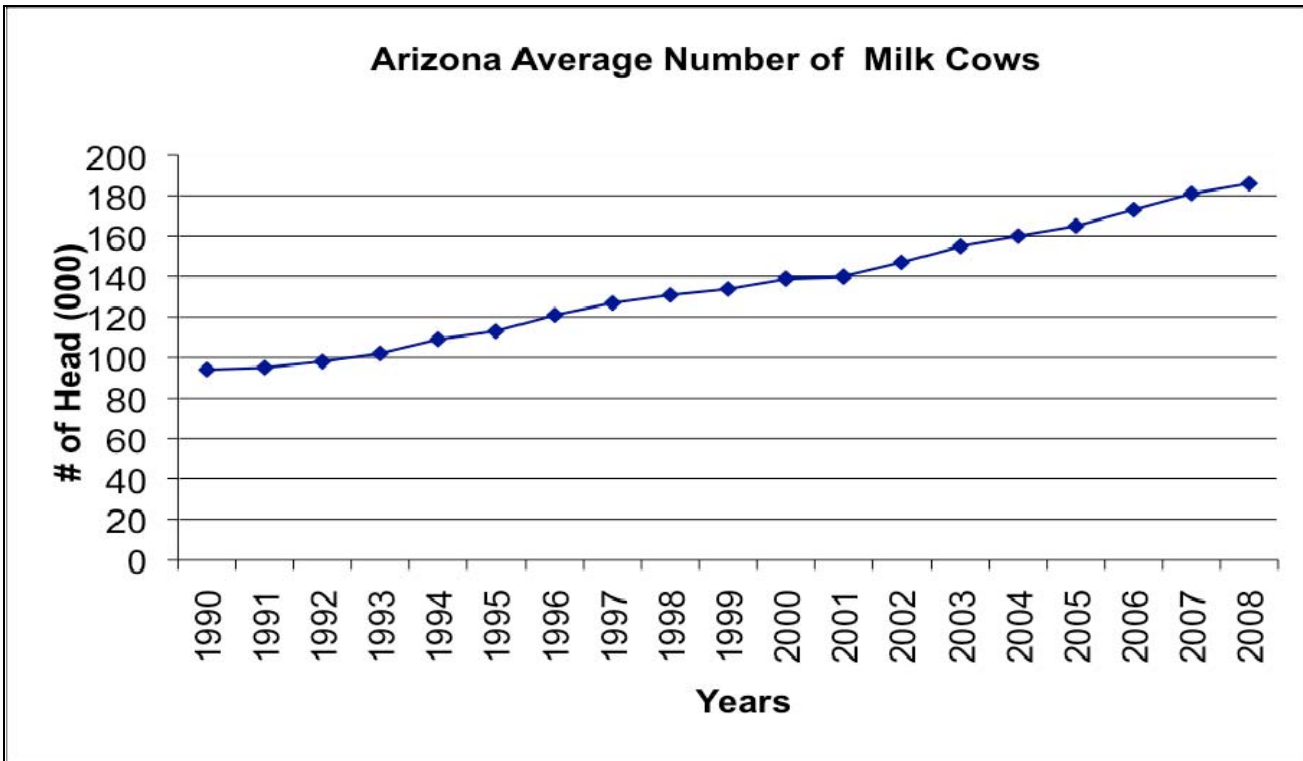
Figure 2.

Arizona's Crop Acreage, 90-08



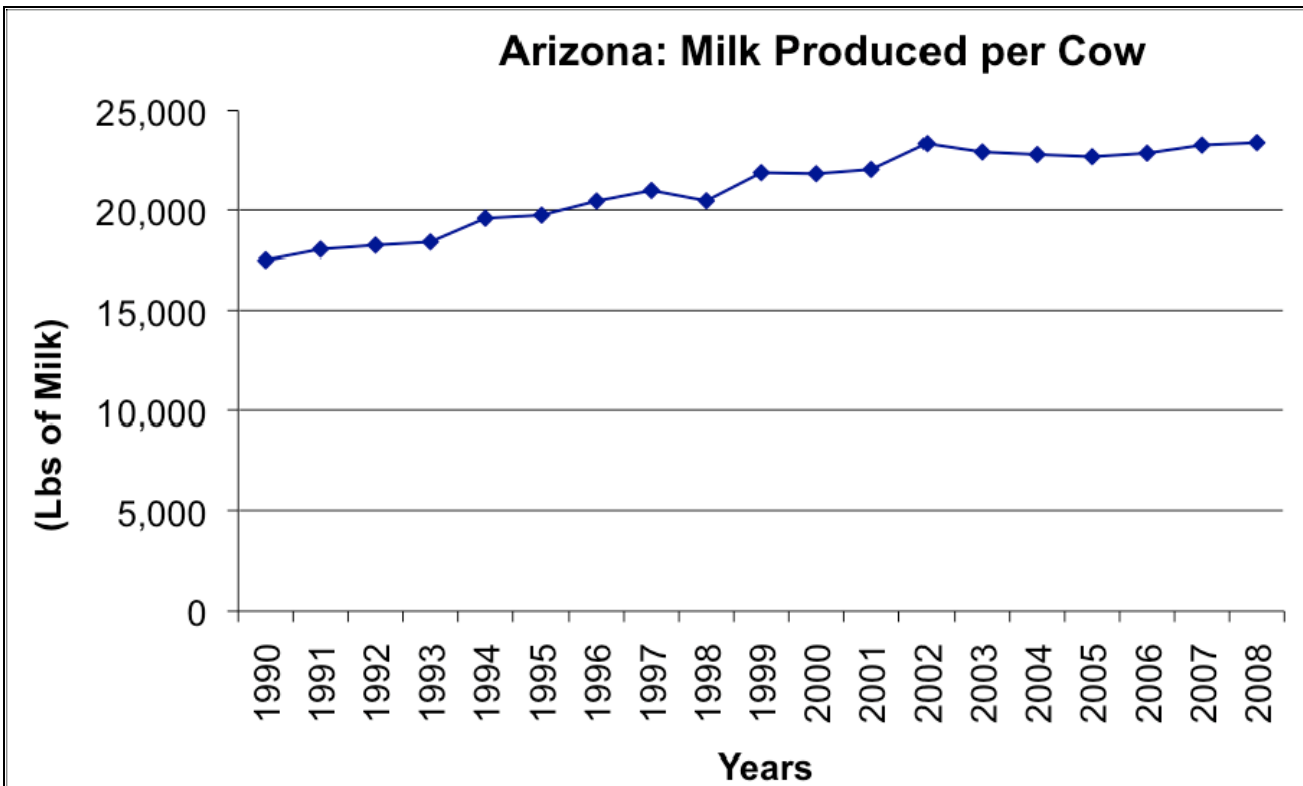
Source: Arizona Agricultural Statistics, various years

Figure 3.



Source: National Agricultural Statistics Service Data Download. Arizona Dairy Industry Summary

Figure 4.



Source: National Agricultural Statistics Service Data Download, Arizona Dairy Industry Summary

The growth in the dairy industry and its need for additional feed can be shown with the continued increase on the number of dairy cows in the state for the same time period. In table 3, we see that during the time periods of 1990 to 2008 the average number of dairy cows increasing from 94,000 to 186,000 cows. While just looking at the average number of dairy cows gives an indication of the need for additional feed it does not necessarily mean the growth in the dairy industry. The next piece of information required is the milk production per cow. Table 4 plots out the milk production per cow for Arizona during the periods of 1990 to 2008. Milk produced per cow, increases from 17,500 lbs in 1990 to 23,382 in 2008 or a 25% increase in production per cow, however during the period of 2003 to 2008 production remains flat.

The next set of figures look at the makeup of the dairy operation within the state examining dairy farm producers both in numbers, size and concentration. First let's look at the trend in the number of operations. Figure 5 the shows the steady decline in the number of dairy operations in Arizona from 290 dairies in 1993 to 180 dairies 2007. The majority of the reduction in dairy numbers comes from the small to mid size dairies ranging from 1 to 199 head of cows declining from 300 to 105 operations in 2007. The larger dairies 200 + head have remained relatively constant ranging from 100 operations in 1993 to 75 in 2007 (table 6).

Figure 5.

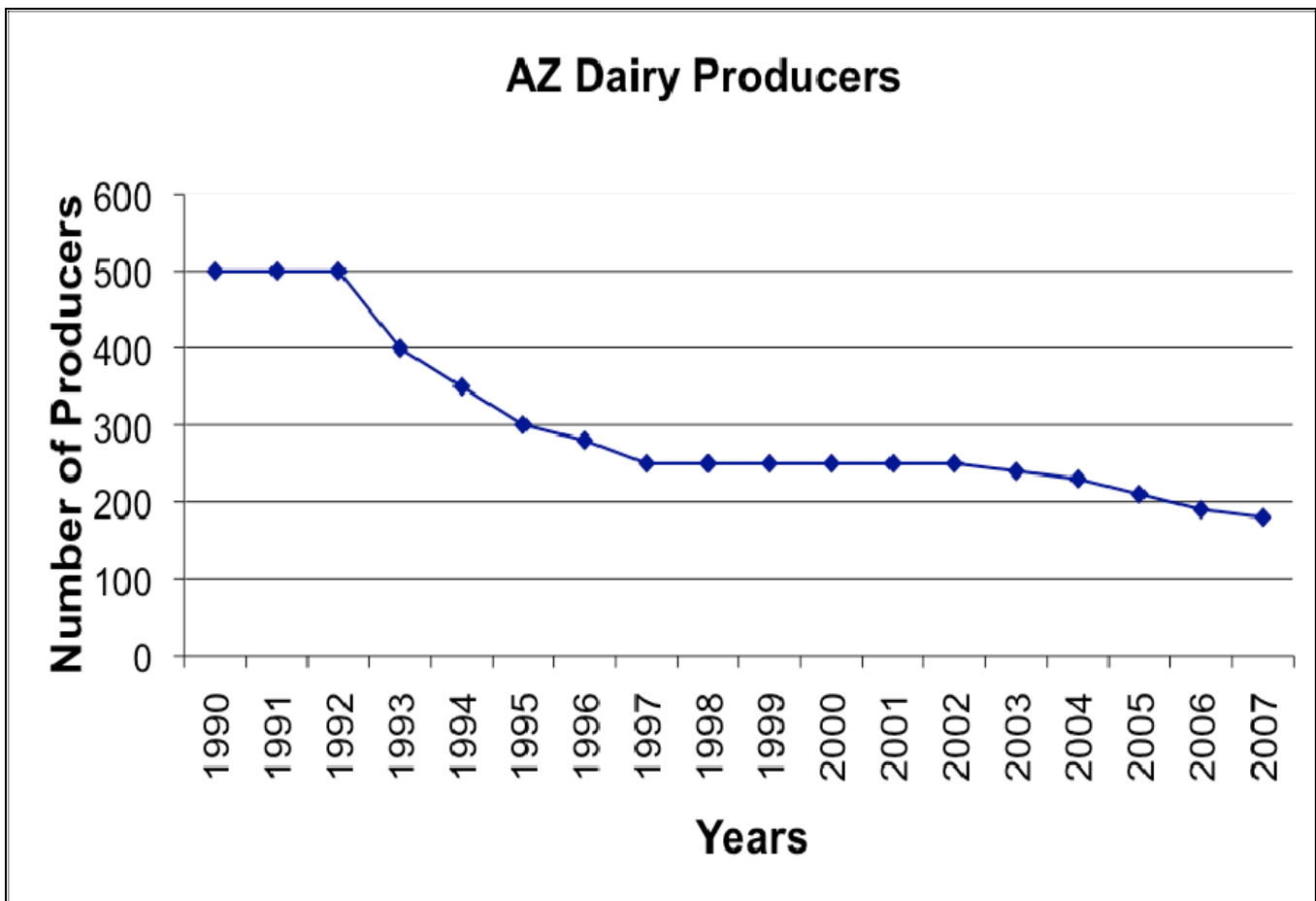
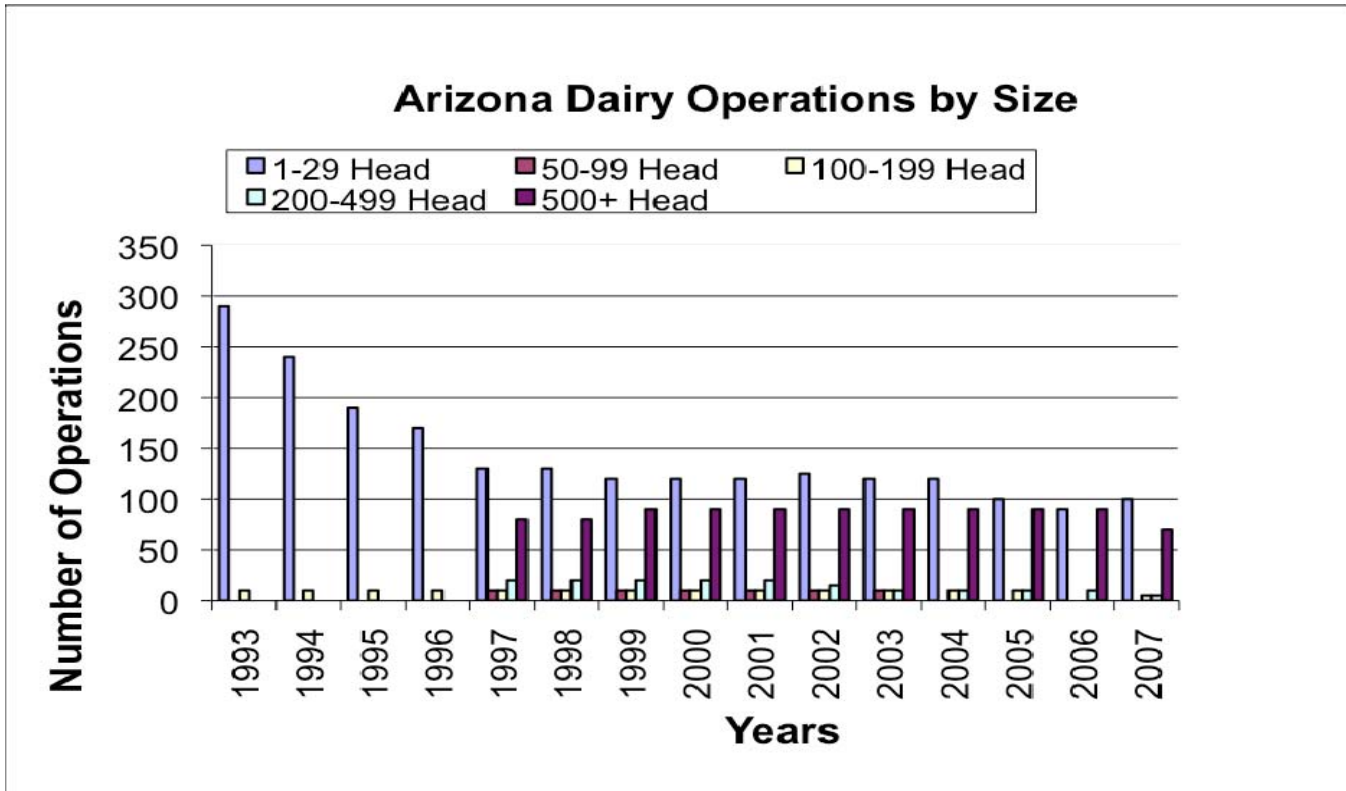


Figure 6.



Source: National Agricultural Statistics Service Data Download, Arizona Dairy Industry Summary

Table 1 shows the concentration of farms by commodity in 2007. For the dairy industry, approximately 49 farms accounted for 75% of all dairy commodities sold in Arizona.

Table 1. Number of Farms Accounting for 75% of Commodity Sales 2007

Commodity	# of Farms and Ranches	% of all Farms and Ranches
Vegetable & Melons	48	1.91%
Fruit & Nuts	13	0.98%
Nursery/Greenhouse	18	6.41%
Cotton	29	9.63%
Cattle & Calves	55	1.35%
Dairy	49	25.79%

Source: 2007 Censuses of Agriculture, National Agricultural Statistic Services

Estimation of Total Economic Impact from Dairy Production

The number of cows and the value of produced milk do not tell the whole story about the role played by dairy farms. They also produce calves and cattle for feeding at other farms and for slaughter, however

The economic impact does not stop at the farm level. Various milk processing industries in Arizona owe their existence to in-state milk production. In the same way, a significant share of the total cattle slaughter-house activity is based on animals from dairy herds.

Dairy farms, other farms feeding surplus dairy calves for slaughter, and dependent milk and meat processing industries require means of production and various services for their activity. These inputs are acquired from a great number of supply industries. And the effect spreads like rings in water from first-round supply businesses to their suppliers, and so on

Further, to assess the full economic impact based on dairy farm production one must take into account the activity that is induced by private spending of personal incomes earned by employees and business owners in the agro-industrial complex of farms and milk and meat processing businesses.

Statistics exist on many of the *direct activities* in identifiable farms and processing businesses. But the value of *indirect effects* spreading around in a large net of businesses on the input supply side cannot be established right away. The same is true for the mentioned *induced* economic effect generated by spending of incomes earned in the agro-industry.

Direct, indirect and induced effects make up the total economic impact on the Arizona economy based on dairy farm production. The total impact can be captured in a so-called input-output model. It provides a systematic and detailed mapping of purchases and sales among about 400 individual industry groups in Arizona. Such basic transaction statistics (latest for 2007) together with computer model software from the Minnesota IMPLAN Group allow for making a model specifically for the dairy industry. The established dairy model estimates the values of direct, indirect and induced effects, respectively, and shares of the total impact can also be assigned to other groups of industries.

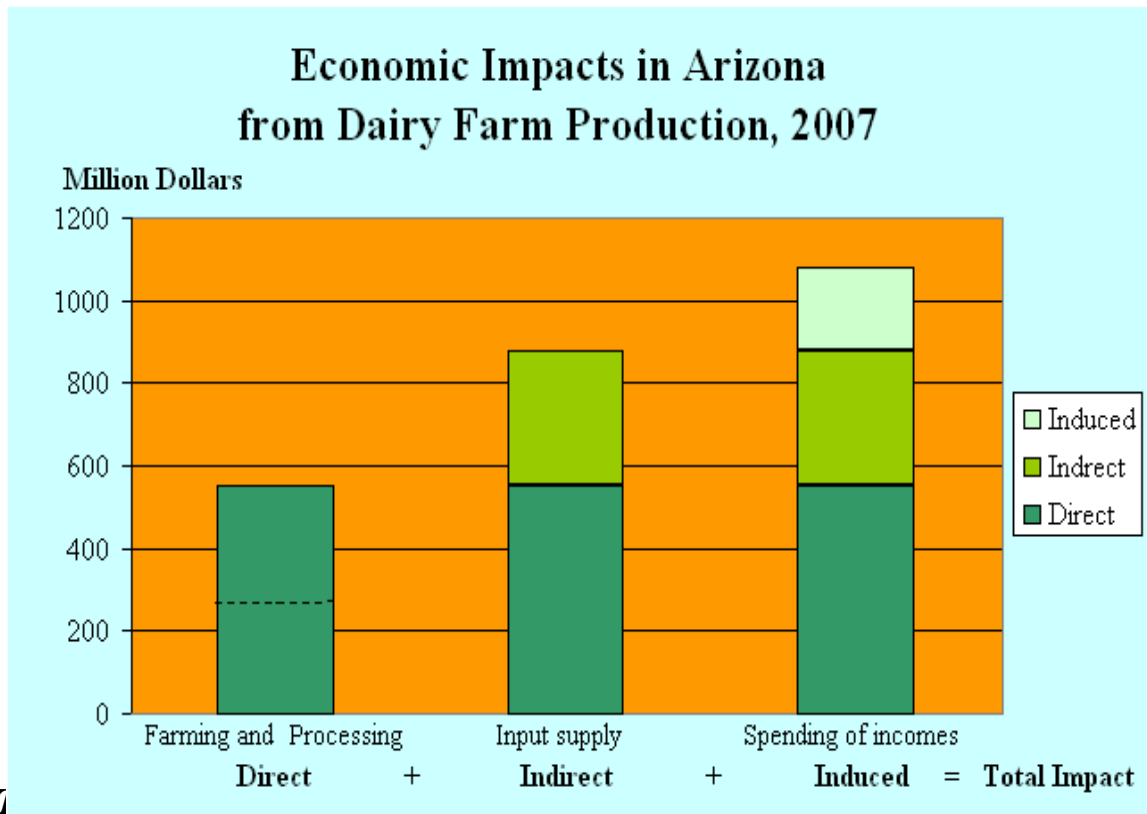
Value-added is the appropriate economic concept for estimating the total effects spreading from dairy farm production to other industry activities. It avoids overlapping and double counting of economic activity. Other bases can be used, for example the effect on *employment*

Total value-added impact

In 2007, dairy farm production brought about \$1,079 million worth of value added in the Arizona economy. This is one-fourth of total direct and derived employment impact based on all agricultural production in the state. Value-added generated directly at farm level came to \$334 million dollars, and the activity was \$220 million worth of value-added in the milk and meat processing industries. The indirect value-added impact in supply businesses amounted to \$323 million while induced private consumption effects came to \$203 million. That is, only about 31 percent of the total value-added activity took place at farm level while 69 percent was the economic activity generated outside primary farms.

In other words: Every value-added dollar at farm level leads to additional \$2¹/₄ worth of value-added in other sectors of the Arizona economy.

Figure 7



In 2007, a total of 15,000 Arizona jobs, employees and business owners, had their basis in the primary production at dairy farms; see Table 2. The input-output calculations show that a little over one-third of the total employment was in farming so that one farm job creates the basis for almost two jobs in other sectors of the economy.

Table 2. Total Employment Impact from Dairy Farm Production in Arizona, 2007

	Number of Jobs*	Percent
Farms	5,174	34.5
+ Processing industries	2,298	15.4
= Direct impact agro-business	7,445	49.9
+ Indirect, other industries	4,395	29.4
+ Induced effect	3,094	20.7
= Total employment impact	14,934	100.0

* The number of jobs is *not* adjusted to full-time basis.

Impacts by industry groups

In addition to the shown distribution of impacts on the three categories (direct, indirect and induced effects) the following two tables illustrate how different groups of businesses are influenced by the activity at dairy and cattle farming and in its directly related processing industries.

Value-added in other basic trades like manufacturing, mining and construction is significantly influenced by the agro-industrial demand of production inputs, which appear in the indirect impact column. Induced impacts, originating in private consumption by income earners in the agro-industry, are generally weighted towards different service sectors in the economy.

Table 3. Value-added Impact from Dairy Farm Production in 2007, Million Dollars

Industry group	Type of impact:	Direct	Indirect	Induced	Total
Dairy and cattle farms		333.7			333.7
+ Milk and cattle processing		219.9			219.9
= Agro-industry sector		553.6			553.6
Other manufacturing			51.3	4.3	55.6
Mining, construction, utilities			23.0	6.1	29.1
Trade, transport, warehousing			92.4	38.8	131.1
Finance, insurance, real estate, prof. services			54.9	49.8	104.6
Entertainm., education., health, other services			101.8	103.5	205.4
Total value-added impact		553.6	323.3	202.5	1,079.4

The same general pattern is found with regard to the distribution of total employment impacts by type of impact and by industry groups.

Table 4. Employment Impact from Dairy Farm Production in 2007, Number of Jobs

Industry group	<i>Type of impact:</i>	Direct	Indirect	Induced	Total
Dairy and cattle farms		5,147			5,147
+ Milk and cattle processing		2,298			2,298
= Agro-industry sector		7,445			7,445
Manufacturing			1,247	50	1,297
Mining, construction, utilities			157	49	206
Trade, transport, warehousing			967	635	1,603
Finance, insurance, real estate, prof. services			468	268	736
Entertainment, education., health, other services			1,557	2,091	3,647
Total employment impact		7,445	4,395	3,094	14,934

* The number of jobs is *not* adjusted to full-time basis.