

# Making Sense of the Census

*Adapted for Alaska by Suzan Benz  
Agricultural Statistician*

## **Materials**

- Census worksheet (last page of this lesson)
- Census information available on line, as Xcel or pdf files (see census1 and census2 on this CD) or in printed form (see URLs)
- Calculators, optional

## **Objectives**

Students will compare properties of the mean and the median using NASS data.

## **Suggested grade levels**

9-12

## **Alaska Content Standards**

Math A 3,4,6; E1-3



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## **Background**

During the Civil War, the U.S. Department of Agriculture (USDA) collected and distributed crop and livestock statistics to help farmers assess the value of the goods they produced. At that time, commodity buyers usually had more current and detailed market information than did farmers. This circumstance often prevented farmers from getting a fair price for their goods. Producers in today's marketplace would be similarly handicapped were it not for the information provided by the USDA's National Agricultural Statistics Service (NASS).

NASS conducts weekly, monthly, quarterly and annual surveys and the five-year census of agriculture. Surveys provide current information about production, economics and environmental topics.

The five-year census of agriculture is the most comprehensive, detailed information-gathering program for agriculture. It is a complete accounting of agricultural production in the United States and is the only source of uniform, comprehensive agricultural data for every county in the nation. From 1840 to 1920 the census of agriculture was taken every 10 years. Since 1925 the census has been taken every five years (currently in the years ending in 2 and 7) to coincide with other economic censuses covering manufacturing, mining and construction. The 2002 Census of Agriculture is the nation's 26th census. Anyone who receives a census report form is required by law to complete and return it.

NASS requests information from farm operators on the following subjects:

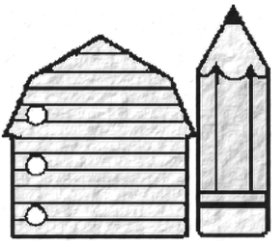
- Land use and ownership.
- Irrigated land.
- Crop acreage and quantities harvested.
- Livestock and poultry.
- Value of products sold.
- Payments for participation in federal farm programs.
- Amount received from Commodity Credit Corporation loans.
- Number of hired farm workers.
- Operator characteristics.

Twenty-five percent of the report forms include additional questions on the following:

- Production expenses.
- Fertilizer and chemicals.
- Machinery and equipment.
- Market value of land and buildings.
- Income from farm-related sources.

**Terms to Define**

mean  
 median  
 statistical averages  
 percent error  
 statistics  
 central tendency  
 data  
 uniform  
 consistent  
 assess  
 goods  
 commodity



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Report forms are tailored for various parts of the country and are specific to the crops grown in a farmer's particular area. Besides helping the farmer get a fair price for the goods produced on his or her farm, census of agriculture data helps all of us as we plan for the future sustained by a safe and secure food supply.

Agribusinesses use census data to develop market strategies and to determine the most effective locations for service to agricultural producers. Farm organizations use it to evaluate and propose programs and policies that can help agricultural producers. Our elected representatives use census data to develop programs to protect and promote U.S. agriculture. Rural electric companies use the data to forecast future energy needs for agricultural producers and their communities. Colleges and universities use it in research programs to develop new and improved methods to increase agricultural production. State departments of agriculture use census data to plan for operations during drought and emergency outbreaks of diseases or infestation of pests.

NASS survey and census data would just be a sea of numbers without tools for interpreting it. Statistics is the branch of mathematics that collects, organizes, and analyzes data. Various statistical operations can be performed on data such as those collected in a survey or census. One such operation is measures of central tendency. Measures of central tendency show averages. Median and mean are two types of central tendencies.

The median is a measure of the "middle" of the data. For an odd number of data points arranged in ascending order, the median is actually the middle value. For an even number of data points it is the value halfway between the two middle data points. For example, census data for 2002 reports the number of farms for the Kenai Peninsula area, as being 119 in 1987; 93 in 1992; and 89 in 1997. In this set, the median, the middle number, is 93. Another set of data, for the entire U.S., shows 2,197,690 in 1994; 2,196,400 in 1995; 2,190,500 in 1996; and 2,190,510 in 1997. In this set, since there is an even number of data points, the median would be 2,193,450 (the halfway point between 2,196,400 and 2,190,500).

The mean is computed by adding all the numbers in the set (119, 93, and 89, in the case of number of farms in the Kenai Peninsula area) and dividing the sum by the number of elements added (3). So the mean number of farms for the Kenai Peninsula area, from 1987 to 1997, would be 100.

**Activity**

1. Ask students what they know about statistics. How do statistics affect their daily lives? For example, those who are athletes might think of how statistics help them know how well they are performing.
2. Share background information about the census of agriculture. Ask students why it would be important to gather statistical information about agriculture. Explain that learning to interpret statistics can help them make good decisions as consumers and citizens.
3. Hand out the data showing statistical information about the number of farms in the Alaska between 1987 and 2002. Explain median and mean. (See background informa-

tion.) On the chalkboard, write the number of farms in Alaska for the years 1987-2002. As a class, find the median and the mean from that set of numbers.

4. Divide students into groups. Assign one area to each group, and hand out the worksheets. Have students work in groups to complete a worksheet for each region.

5. Have students report their findings and discuss what the numbers say about trends in agriculture for each region. Are farms growing larger as the total number of farms decrease?

6. Discuss central tendency. Ask which would be least influenced by a change in one of the individual numbers—mean or median? What sorts of changes in a data set make the mean change? What sorts of changes in a data set make the median change? Discuss how these changes would affect interpretation of the census data.

#### **Additional activities**

1. Have students look for examples in the popular press where the mean of a data set is cited and other examples where the median is cited. Why do you think the authors of those articles chose to cite those particular measures of center? Would readers have received a different impression of the data under discussion if other (or additional) measures of center had been reported?

2. If computers and Internet connections are available, direct students to the NASS Web site, [www.usda.gov/nass/](http://www.usda.gov/nass/). For Census of Agriculture data, go to “Census of Agriculture, then “Highlights. Click on your state, then “[your county] Census Highlights.” Have students find data for another state or county showing number of farms and economic sales classes for 1978 through 1997. Using the mean and median, have students describe the trends for farms in that county.

3. On the NASS Web site, have students find the top three crops grown in your state and county. Students may use NASS survey data, which provide more current estimates, or census information data, which provide information that is more comprehensive and is the only source of uniform agricultural data for every county in the United States.

4. Instruct students to find 10 other states or counties that grow the same crops as those grown in your state, and create a graph that shows the median and mean for production levels. Ask students “If you wanted to build a processing plant to add value to that crop, how might this historical data be useful?”

#### **Websites**

[www.usda.gov/nass/](http://www.usda.gov/nass/)

<http://www.nass.usda.gov/ak/>

<http://www.usda.gov/nass/nasskids/kidpg.htm>

Name \_\_\_\_\_

# Making Sense of the Census

Area \_\_\_\_\_

Total number of farms

1987 \_\_\_\_\_ 1992 \_\_\_\_\_ 1997 \_\_\_\_\_ 2002 \_\_\_\_\_

Median \_\_\_\_\_ Mean \_\_\_\_\_

Farms earning \$1,000-9,999

1987 \_\_\_\_\_ 1992 \_\_\_\_\_ 1997 \_\_\_\_\_ 2002 \_\_\_\_\_

Median \_\_\_\_\_ Mean \_\_\_\_\_

Farms earning \$10,000-99,999

1987 \_\_\_\_\_ 1992 \_\_\_\_\_ 1997 \_\_\_\_\_ 2002 \_\_\_\_\_

Median \_\_\_\_\_ Mean \_\_\_\_\_

Farms earning \$100,000 and over

1987 \_\_\_\_\_ 1992 \_\_\_\_\_ 1997 \_\_\_\_\_ 2002 \_\_\_\_\_

Median \_\_\_\_\_ Mean \_\_\_\_\_

Did the total number of farms increase or decrease between 1987 and 2002?

Did the total number of farms earning \$1,000-9,999 increase or decrease between 1987 and 2002?

Did the total number of farms earning \$10,000-99,999 increase or decrease between 1987 and 2002?

Did the total number of farms earning \$100,000 or more increase or decrease between 1987 and 2002?

What conclusions can you draw about this area from the statistics?