

**Distr.
GENERAL**

**CES/SEM.49/5
4 November 2002**

ENGLISH ONLY

**STATISTICAL COMMISSION and
ECONOMIC COMMISSION
FOR EUROPE**

**CONFERENCE OF EUROPEAN
STATISTICIANS**

**Joint UNECE/Eurostat/FAO/OECD
Seminar on Agricultural Statistics:
Perspectives for Agricultural
and Rural Indicators and Sustainability
(Paris, 21-22 November 2002)**

**COMMISSION OF THE EUROPEAN
COMMUNITIES (EUROSTAT)**

**FOOD AND AGRICULTURAL
ORGANISATION (FAO)**

**ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT
(OECD)**

**AGRICULTURAL SUSTAINABILITY—THE HUMAN DIMENSION
PERSPECTIVE FOR AGRICULTURE AND RURAL INDICATORS
AND SUSTAINABILITY**

Invited paper submitted by the Department of Agriculture,
National Agricultural Statistics Service, United States*

I. Introduction

Most definitions of agricultural sustainability center on maintaining a level of economic well being over time without causing deterioration to the environment. A broader definition includes the idea that everyone deserves equal economic opportunities. This has led to discussions about the ‘Triple Bottom Line’, a philosophy that links sustainability to economic prosperity,

* Prepared by Mr. Fred Vogel.

environmental quality, and social equity. When considering the sustainability of agriculture, the human dimension must also be considered. Since agriculture is essentially rural by nature, issues about its sustainability become entangled with rural sustainability as well.

Agriculture is unique as an industry in the U.S. because farm operators, partners and their unpaid family members account for over 70 percent of the production workforce. Policy to sustain agriculture as a viable industry needs to maintain the viability of the farm household as an economic unit. The remaining third of the workforce, hired workers, is one of the most economically disadvantaged groups in the U.S. As a group, they are younger and less educated, and receive lower wages than the average for all wage and salary workers.

The median weekly earnings of hired farm workers in 1997 were only 55 percent of the median earnings of salary workers economywide. Again, the implications of changing U.S. policies and programs for farm employment and wages needs to go beyond sustaining this workforce, but improving their situation. The unemployment rate for hired farm workers in 1998 was one of the highest for all major occupations.

Labor statistics are used to monitor the labor supply and the rate of employment, develop and monitor policy, evaluate productivity, and to measure labor's contribution to the economic accounts. Current labor statistics are not well suited to providing an understanding how labor enters into the equation when examining sustainability issues.

This paper will first provide an overview of the sources of labor statistics and the basic information provided. This will be followed by a review of the uses of labor statistics and their capability to meet those needs. It will conclude with a review of the labor information the National Agricultural Statistics Service (NASS) and the Economic Research Service (ERS) collect in their Agricultural Resource and Management Survey (ARMS) and a discussion how the information can be used to understand issues affecting agricultural sustainability from the human dimension.

II. Review of Labor Statistics

Agricultural labor is defined as work performed on a ranch, farm, or other agricultural entity engaged in the production of crop or livestock commodities. Agricultural labor encompasses field work including the operation of machines, livestock work, supervising and managing other farm employees, and other activities related to the farm business such as bookkeeping, machinery repair, etc. This simple definition masks the more complicated concepts underlying the definitions of labor that affect the resulting requirements for labor statistics.

One first should have an understanding of the agricultural labor force in the U.S. For example, farm operators and unpaid family workers or partners account for about 70 percent of the agricultural labor. Most of this labor is unpaid in the sense that the operator, family members and

partners usually do not receive wages, but share in the income and profits of the farm business. From a productivity point of view, it is difficult to place a value on this labor; some different methods will be presented below.

About 30 percent of the farm workers are classified as hired workers. To complicate matters, not all hired workers are paid directly by the farm operator. Fruit and vegetable harvest still depends on manual labor. It is common for the farm operator to contract with a crew leader to supply the workers. The farm operator pays the crew leader a fixed fee; the crew leader in turn hires the workers, supervises their work and pays them for their labor. This is not an issue in measuring employment and productivity; however, it does affect how labor is included in agriculture's contribution to the national economy because contract labor is included in the service sector, not the agriculture sector.

Another complicating factor when measuring agricultural employment stems from the use of "custom operators." Some farm operators do not wish to incur the \$100k plus cost of purchasing harvesting equipment. Others do not want to deal with the licensing required to apply certain pesticides. Instead, they hire others to apply the pesticides or to harvest the crop. In this case, the farm operator is paying not only for labor, but for the machine hire as well. The people operating the machines are either self-employed or are on the payroll of the owner of the equipment or business. Custom work is also classified in the service sector.

The service sector also includes other services such as veterinarians.

There is no single source of data that provides information on the supply of labor, wages, earnings, and characteristics of farm workers. The situation is further confounded because some farm work can fall into both farm and service industry classifications and are not measured consistently. A review of the primary sources of labor data follows.

Current Population Survey. The primary source of labor data in the U.S. comes from the Current Population Survey (CPS) conducted monthly by the Census Bureau. This survey is based on a complex, rotational sample designed to provide both measures of level and change that includes 50,000 households. Each month the household is in the sample, enumerators complete a questionnaire for each household member age 15 and older. The questions determine each household member's labor activity during the survey week which is the calendar week containing the 12th day of the month. Workers in a sub-sample of the households are asked additional questions about weekly hours worked and earnings.

The survey also collects information on the demographic, social, and the economic characteristics of the respondents. The ERS uses annual averages of the monthly data to prepare profiles of hired workers (Runyan 1998). A calendar week was selected as the survey reference period because it must be short enough so that the data obtained are current. The actual survey is conducted during the following week.

The CPS counts employed persons as “all those who, during the reference week did any work at all as paid employees, worked in their own business, profession, or on their own farm, or who worked 15 hours or more as unpaid workers in a family-operated business. This definition includes workers who did not work during the reference week because of situations such as bad weather and whether or not they were paid for the time off. In agriculture, this means that people who normally are working are included during the reference week even though weather or other events precluded them from working during the reference week. They would be shown as employed with no hours worked.

The data show the total number of workers in agriculture, the number of farm operators and managers, and the number of hired workers. Hired workers are those doing farm work for cash wages or salary as their primary employment. Hired farm workers include people paid to manage farms for employers, supervisors of farm workers, and farm and nursery workers. The hired worker category includes those hired directly by the farmer and those employed by farm labor contractors. The CPS results also show the number of service workers. However, these data do not directly relate to agriculture. For example, CPS data for 2000 showed there were about 38,000 veterinarians, however, there is no count of those that worked on farms. A related example is that the number of pesticide applicators does not reflect those that actually worked on farms.

Agricultural Labor Survey. The primary source of information about the number of hired farm workers and their wage rates comes from the Agricultural Labor Survey conducted by the National Agricultural Statistics Service in the U.S. Department of agriculture. The survey is conducted quarterly with its reference period the 12th of the month to coincide with the CPS described above. The sample design is also complex, but the sampling unit is the farm as a business unit. In two states, California and Florida, the sample design includes business units such as crew leaders and other agricultural service providers.

The survey obtains from each selected farm the number of hired workers on its payroll during the reference week, the hours worked by type of work, and wages earned. No demographic information about the farm workers is obtained. The survey also obtains information about the size of the farm in terms of annual sales and its major production activity.

Each respondent is also asked to report the number of service workers working on their farm during the reference week. The agricultural service definition includes contract labor, custom work, and other services such as veterinarian work. The survey in California and Florida, because they dominate the fruit and vegetable production in the U.S., also obtains number of workers, hours worked, and earnings for people hired by agricultural service firms and who worked on a farm during the survey week. These data more accurately focus on service work done on farms than do data obtained from the CPS. However, the NASS survey does not provide any demographic data about the service workers.

The data reported each quarter by NASS shows the total number of hired workers including those provided by agricultural services. Average hours worked and wage rates for the U.S., major regions, sales class of farm and type of farm are only shown for workers hired by the farm operator. The only additional data for service workers is the number hired, hours worked, and wages for California and Florida.

Data from the July 2002 Agricultural Labor Survey showed that 20 percent of the paid workers in agriculture were actually service workers who worked on farms. A serious data gap is the lack of information about their hours worked, wages earned, and whether they worked full or part time.

Census of Agriculture. The Census of Agriculture reference period is for years ending in 7 and 2 and is also conducted by NASS/USDA. It provides the most comprehensive source of geographic coverage of hired and contract labor as measured by labor expenditures. All expenditures for labor involved in custom work are combined with expenses for machine hire. The expenditure data are also used to show the magnitude of labor use and to estimate the share of production expenses attributed to labor by economic sales class of farm and by major activity such as crop, fruit, livestock, etc.

The census form also obtains the number of people employed during the year by two categories of number of days worked. The categories are plus or minus 150 days. The Census does not obtain information on the demographic and job characteristics of hired and contract workers.

One of the weaknesses of the previous censuses is that the forms obtained only personal characteristics such as age for one person from each farm or ranch. For partnerships or family corporations, such information is obtained only for the senior operator. Thus in a parent/offspring relationship, age would be recorded only for the older adult. About 13 percent of the U.S. farms are partnerships or family corporations; thus there is clearly a chance to under represent younger people in the count of farm operators. An interesting sidelight is that these farms accounted for over 40 percent of the market value of farm products sold in 1997.

The sample design for the Current Population Survey as described above includes households and the employment of each person in the sampled household. Therefore, all members of a partnership or family corporation have a chance to be in the sample and report their occupation. The CPS data for 1997 showed 219,000 farm operators under age 35 while the Census of Agriculture for the same period reported only 149,000. This weakness in the census data may have incorrectly led researchers and policy makers to conclude there was a serious situation concerning the supply of young farmers. This certainly had to confound productivity measures as well.

For the first time, the 2002 Census of Agriculture will obtain the number of individuals involved in the day-to-day operation of the farm and of those, the number that are women. Demographic information for up to three primary operators per farm will also be obtained. The respondent will

determine which three to list if there are more than three. The demographic questions for each operator will include, sex, principal occupation (farm operator or other) number of days worked off the farm during the year for pay, age, and race and ethnicity. For comparison purposes with previous censuses, the principal operator will be identified.

III. Uses of Labor Statistics

Employment. The basic use of labor statistics is to provide a measure of the number of people in the labor force and for those that are working, the number hours worked and wage rates. Hired farm workers account for less than 1 percent of the US labor force. However, they make an important contribution to agricultural production. Hired farm workers are some of the most economically disadvantaged groups in the country experiencing low wages and only seasonal employment. As a result, policy issues include legislation to improve farm worker living and working conditions, including proposals relating to immigration and the minimum wage.

The primary weakness of the agricultural employment data is coverage. The CPS includes 50,000 households, which means that less than 1,000 represent members of the agricultural labor force. Inferences about agricultural employment rates can be made only at the national level, which fails to capture the seasonal and diversity of the country's agriculture. The sample design for the NASS Agricultural Labor Survey attempts to target farms likely to hire farm workers, therefore, inferences can be made by type and size of farm and regionally. The problem is that only quarterly data are available, and because of the vagaries of nature, the weekly reference period may totally miss peak labor periods.

A major weakness of both series is that more detailed information is needed about workers hired by service firms such as the number employed, hours worked, and wage rates by type of work and size of farm where the work was done.

Productivity Analysis. One of the successes in the U.S. economy has been the growth in agricultural productivity. Investments in plant and animal breeding have resulted in consistent year-over-year increases in crop yields and output of meat and products per animal or bird. Management practices such as the use of fertilizers, pesticides, improved feed rations, etc, have also contributed to the growth in productivity. At the same time, the number of farm workers has declined. The purpose of productivity analysis is to understand and describe the factors contributing to agricultural productivity.

The Bureau of Labor Statistics (BLS) in the US Department of Labor defines productivity as "a measure of economic efficiency which shows how effectively economic inputs are converted into output." Labor productivity is simply the ratio of the output of goods and services to the labor hours used to produce it. The most commonly used measure is output per hour of all persons.

The indexes of output per hour measure the changes in the relationship between output and the hours expended in producing that output. The labor productivity index is the index of industry output divided by an index of hours.

Productivity measures usually include different products or services. Output is calculated using a Tornquist formula as described in the BLS Handbook of Methods. The formula provides the ratio of output in a given year to that in the previous year. These ratios are chained across years; the chained index is used in the productivity formula.

The fact remains that these measures of output per hour only relate output to labor time and do not include the contribution of capital or other factors related to production. Another limitation for agriculture labor productivity indexes related to hours is that no distinction is made between hours worked by different groups of workers. For industries like agriculture where self-employed and unpaid family workers are important, indexes are constructed based on the hours of all persons including paid employees, partners, farm operators and family members with no weighting to reflect their relative contributions.

The Economic Research Service in the USDA has provided the most definitive analysis of agricultural productivity. A paper by Ahearn (1998) provides detailed, technical information about their system for calculating productivity.

They describe productivity as *Total Factor Productivity*, which is ratio of total outputs to total inputs, with both measured in index form. Farm outputs are measured as the total receipts from the sale of farm products. Inputs include expenditures for capital, labor and intermediate inputs such as feed, fertilizer, seed, and inputs to production. Dollars received and expended are the unit used for aggregating the data using an index number procedure to calculate the input and output indexes. They also expand the analysis to include partial productivity measures; the most common one is the measure of labor productivity.

Labor input in agriculture has decreased consistently over time. Ahearn showed that the labor input index dropped at an average rate of 2.73 percent per year. This labor input index considered not only the hours worked in agriculture, but the quality of those hours as measured by factors such as education. As stated above, all inputs and outputs are converted into dollar units in the index computations. The ERS approach is that “the value of labor services is equal to wages plus supplements paid to hired workers plus the imputed compensation to self employed and unpaid family labor. The imputed wage of the unpaid and self employed workers is set equal to the mean wage of hired workers with the same demographic characteristics.” In other words, the value of the farm operator’s time for management, operation of complex equipment, and other labor is valued by wages earned by hired farm workers whose earnings are below the median of all workers in the U.S. economy. Another way of looking at the issue is that 70 percent of the input is imputed based on the 30 percent for which wages are available.

Productivity measures can be used as an indicator of the sustainability of the farm sector as compared to other sectors. In that case, the labor input is consistently measured. However, one can seriously question how well labor as an input truly reflects its relative contribution to the productivity measures.

The main point is that the productivity measures do not capture the well being of the people supplying the labor; neither for the farm and family workers, nor the hired workers. They do not provide a measure of the sustainability of the farm household nor the farm worker's household.

Economic Accounts for Agriculture. The ARMS survey and the Census of Agriculture both provide expenditures for hired workers, contract workers, custom work and other farm service activities. All are considered expense items when determining net farm income. However, hired worker expenses are not considered a cost when measuring agriculture's contribution to value added to the economy. Contract labor, custom work, and other agricultural services are part of the service sector and therefore considered to be a deduction from the value added by agriculture. One could argue that this is an accounting process and not relevant as an indicator of the sustainability of agriculture, or the sustainability of labor as an input.

IV. The ARMS Approach

The quinquennial Census of Agriculture provides comprehensive coverage of crop and livestock production and inventories, sales, expenditures, and demographics of the farm operator. For the first time, the 2002 Census will provide demographic information for up to three people involved in the operation of the farm. The reference period for the census is the 2002 calendar year. Data collection will begin in late December 2002 and continue through April 2003.

The basic mode of data collection for the census is the use of a mail questionnaire and two non-response mailings. Farms not responding at that time will be contacted by telephone and some personal enumeration.

In between census years, the ARMS survey provides similar information about the production and economic information of farms. It also obtains more specific information about the farm household such as off farm income, farm assets, and more information about the characteristics of the farm household. An example is a question about the amount spent on household and family living expenses for 2002.

When the Census of Agriculture was transferred to NASS prior to the 1997 census, a major decision was made to integrate the census data collection with the ARMS survey for those operators to be included in both. The result was a combined census/ARMS questionnaire that was obtained by personal enumeration. Census records identified, as overlapping the ARMS sample did not receive a mail questionnaire. Instead, an enumerator contacted them to schedule an interview to complete the combined ARMS/census form. A similar procedure will be used for the 2002 ARMS and census period.

The combined form obtains a rich combination of production, economic, environmental, and demographic information about the selected farms. Table A provides a summary of the information to be obtained to provide an understanding of the human dimension of agriculture and how that relates to labor issues.

The first part of Table A shows the basic expenditure data to be obtained about cash wages paid, contract labor, custom work, and other services. Note that the form will also determine who paid for the labor, i.e., the operator, the landlord, or a contractor who has a contractual arrangement with the farm for the production of some crop or livestock items. The primary purpose of this breakdown is to isolate expenditures paid by the farm operator from those paid by others.

A critical part of the ARMS/Census form is the section that will obtain hours worked, both paid and unpaid, by the operator, spouse, and partners and other family workers. According to the ERS economists, these data are used to estimate rates of returns to agricultural assets and equity and to derive an implicit unit wage based on income divided by hours of work. When one considers that over 70 percent of agricultural labor is provided by the operator, unpaid family members, and partners, this section provides a key indicator of the economic sustainability of the farm from a labor point of view.

A major part of the ARMS/Census form will be the linkage to the information on operator characteristics for the principal operator and two others. For the first time, information about labor expenditures, hours worked, and other production characteristics of the farm can be connected to the demographic characteristics of up to three operators per farm.

V. Summary

There are many weaknesses in the measures of agricultural labor in the U.S. from a sustainability point of view. First, little is known about the hired worker households. Second, there are few linkages to the rural economy in which they live and work. One major weakness is the lack of information about the workers doing farm work, but are contract or service workers and fall into the service sector.

The Economic Research Service has used the ARMS survey to examine the economic well being of U.S. farm households. This provides very relevant measures of the viability and sustainability of agriculture because the farm household is the major contributor to the agricultural labor force. Their August 2002 release "Outlook for Farming's Contribution to the National Economy and to the Economic Status of Farm Households" provides a very definitive overview of the economic situation of farms and farm households.

The combined ARMS/Census survey will strengthen this analysis by concerning more information about operator characteristics with the use of labor. The missing ingredient is similar

household information about the hired workers. This is needed to as an indicator to understand the sustainability of this source of labor.

Finally, too little is known about workers in the service sector to fully understand the sustainability of the labor force for agriculture. More complete information is needed about hours worked, earnings, worker demographics, and the household income situation.

References

Ahearn, Mary, Jet Lee, Eldon Ball, and Rich Nehring (1998), "Agricultural Productivity in the U.S.," Agricultural Information Bulletin Number 740.

Runyan, Jack L., (1998), "Profile of Hired Workers, 1998 Annual Averages," ERS, USDA Agricultural Economic Report No. 790.

Table A

Agricultural Resource Management Survey – Labor Data Obtained

	Expenditures			
	Farm Operators	Landlord (s)	Contractor(s)	
Cash Wages Paid				
· Hired Workers				
· Operator				
· Operator's Spouse				
· Other Household				
· Other - Partnership				
Contract Labor				
Custom Work				
Veterinarian & Other Services				
	Hours Worked			
Hours/week (Paid & Unpaid)	Jan - Mar	April-June	July Sep	Oct-Dec
Operator				
Spouse				
Partners & Family Workers				
	Operator Characteristics			
Age, Sex, Race, Education	Principal Operator		Operator 2	Operator 3
Days Off-Farm Work				
Principal Occupation				
Number in Household				
Major Farm Activities				
Household assets/income			**	**
