

Compensating Farm Workers through Piece Rates: Implications on Harvest Costs and Worker Earnings¹

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Introduction

Piece rates are a common method of payment for farm workers who harvest fresh fruit and vegetable crops. A piece rate directly affects both production costs and farm worker hourly earnings. The purpose of this paper is to explain how a piece rate payment system works and further explain its implications on production costs and farm worker earnings. Various points are illustrated through citrus and tomato harvesting examples.

A piece rate is the amount of money paid for one unit of work. Piece rate is a convenient system to pay for labor services when "units of work" are easily measurable and can be characterized by repeatable actions. In agriculture, a unit of work varies by the crop and the task being performed. For example, workers who tie tomato plants could be paid per 100 linear feet, while citrus budders³ are paid per grafted bud eye. When harvesting oranges, one unit of work is defined as picking 90 pounds of fruit (referred to as one "box") and placing it into a collection tub positioned near the base of a tree. For tomato harvesters, one unit of work equals filling a bucket weighing between 30 and 35 pounds and then

carrying the bucket to a flat-bed truck where it is unloaded into a gondola or collection bin.

A worker's daily earnings are calculated by multiplying the piece rate by his productivity, which is defined as the number of units of work accomplished that day. Productivity of harvest workers varies by crop, growing conditions, weather, and the physical stamina of a worker. On average, citrus harvesters pick between 8 and 11 boxes per hour (Polopolus et. al. 1996); tomato harvesters average between 15 and 27 buckets per hour (Roka and Emerson 1999). If the piece rate for harvesting oranges is 80 cents per box (90 pounds) and a worker picks 80 boxes (7,200 pounds) of oranges during the course of one day, his total earnings for that day would be \$64. If the same worker spent 8 hours harvesting, his average productivity would be 10 boxes per hour and his average hourly earnings would be \$8.

Advantages, Disadvantages, and Market Competition

From an employer's perspective, a piece rate system provides two advantages over an hourly wage

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system. First, a piece rate establishes in advance the unit cost for the job a worker is hired to do. For example, piece rates of 80 cents and 50 cents for orange and tomato harvesting, respectively, set the unit cost for the harvesting of those crops. Second, a piece rate system does not require close and constant supervision of a worker's productivity, so workers need to be self-motivated. The higher a worker's productivity, the more income a worker earns.

A flat hourly, or wage, rate is an alternative payment system to piece rates. While an hourly wage system guarantees a fixed rate income, it also removes the opportunity for a worker to earn more than the stated hourly wage. Because an hourly wage system removes the productivity incentive, employers may be disadvantaged if worker performance has a direct influence on unit costs. If hourly or daily output levels are important, close supervision of worker effort is required under an hourly wage system to prevent low productivity from increasing overall unit costs of production.

The harvesting of fresh fruits and vegetables is well suited to a piece rate payment method because harvesting involves repetitive actions and a piece rate system is an efficient means of achieving adequate levels of worker productivity. While close supervision for productivity is not important, supervision of piece rate workers to ensure performance *quality* is necessary to avoid adverse consequences. For example, productivity incentives tend to drive workers to harvest at faster speeds, which in turn could damage or prematurely destroy a plant. Rough handling of a tomato bush during the first harvest (also known as "crown" pick) could damage a plant so that a second, third, or even fourth harvest from the same plant would be impossible. In addition, fruit quality may suffer as workers disregard market standards for faster harvesting speed. Tomatoes grown in Florida are produced for the fresh market and require higher quality cosmetic standards than tomatoes produced for processing. Blemished fruit or harvested fruit that does not meet market quality requirements must be culled or discarded, resulting in a direct financial loss to the grower.

As mentioned previously, harvest piece rates directly establish a unit cost for the task being performed. Furthermore, a change in piece rates changes the overall unit costs of production on a dollar-for-dollar basis. If the piece rate to harvest oranges increases by 20 cents per box, then the total unit cost of orange production increases by 20 cents as well. For other inputs, such as fertilizer, seed, and machinery, higher costs can be absorbed into the production process in such a way that overall unit cost increases may be less than the increase in price of the input. For instance, higher nitrogen costs could lead a grower to apply less fertilizer, or apply fertilizer more judiciously to better match crop growth needs.

Oranges and tomatoes are agricultural commodities and, within the commodity marketplace, low cost producers enjoy a significant competitive advantage. Profit per unit of production can be expressed simply as:

$$\text{Profit/unit} = \text{Market Price/unit} - \text{Cost/unit.}$$

By definition, a commodity is a product whose characteristics are similar across all growers. As such, commodity markets do not allow for differentiation among individual growers, thus forcing all growers to accept the same established market price. The only way for commodity producers to remain profitable is for them to manage, and perhaps lower, their respective costs. Over the long term, producing a profitable agricultural commodity is a challenge. Agricultural commodities face intense supply-side pressures. Profitable crops encourage growers to expand their production, causing future supplies of that crop to increase. Since long-term consumer demand for most agricultural products is flat, or at best slowly rising with population growth, a crop that is initially profitable will be oversupplied, leading to an inevitable decline in market price. A producer who has lower unit costs can afford to receive a lower market price and still earn a positive profit.

Most, if not all, of Florida's fruit and vegetable commodities compete within a global marketplace. Orange production in Sao Paulo, Brazil, which is processed primarily into orange juice, strongly influences the global orange juice market, which in

turn influences the price of oranges grown for juice processing in Florida. Similarly, Mexican tomatoes are grown and shipped to the same winter markets as Florida tomatoes, which influences prices received by growers in both production regions. During the 2007–08 season, Brazilian orange growers in Sao Paulo paid their harvest workers less than 50 cents⁴ (U.S. dollars) to harvest one box (90 pounds) of fruit. During the same season, Florida growers paid between 80 and 90 cents, at least 60% more, to harvest one box of oranges. As long as product quality standards are met for frozen concentrated orange juice (FCOJ) or for fresh market tomatoes, oranges grown in Brazil and tomatoes grown in Mexico are equivalent to oranges and tomatoes grown in Florida.

The Minimum Wage and the Effective Piece Rate

While there exists significant economic pressure to lower costs, including harvesting piece rates, public policies such as state and federal minimum wage laws are designed to increase farm worker income. Farm workers, like all other workers, are guaranteed to be paid at least a minimum hourly wage. Workers performing at the lower end of the productivity range will benefit the most from an increase in minimum wages. At the same time, however, an increase in the minimum wage without a corresponding increase in worker productivity will result in higher "effective" piece rates and increase a grower's unit cost of production.

If a worker's productivity is low and at a level where at the stated piece rate he fails to earn the minimum wage, his daily earnings need to be augmented until total daily earnings equal the hours worked multiplied by the minimum wage. This increase in total daily earnings to match the minimum wage rate is known as "build up." To illustrate, consider a citrus harvester whose average productivity since 2002 has been 8 boxes per hour. If, in 2002, this worker were paid a piece rate of 70 cents per box, his hourly earnings were \$5.60. In 2002, both the Florida and federal minimum wage rates were set at \$5.15 per hour; hence the worker earned above the minimum wage threshold at a piece rate of 70 cents. In 2008, Florida's minimum wage increased

to \$6.79 per hour. The same worker, whose productivity remained at 8 boxes per hour, would need to be paid at least 85 cents per box simply to meet the higher minimum wage. Effective January 1, 2009, Florida's minimum wage increased to \$7.21 per hour. On July 24, 2009, Florida's rate will be surpassed by the federal minimum wage of \$7.25 per hour (USDOL 2008). The effective piece rate payment for our 8-box-per-hour worker will have to increase to 90 cents per box to conform to the 2009 federal minimum wage law.

Summary

Harvesting fresh fruits and vegetables relies on the extensive use of hand labor. Furthermore, it is likely that fresh fruit and vegetable growers will continue to utilize hand labor to harvest their tender crops well into the future. Robotic technologies, while evolving rapidly, cannot match the discernment of a human eye, gentleness of a human touch, nor the outright speed of a human hand to harvest appropriate fruits. A piece rate system is a viable method of employing harvesting workers. Piece rates reward productivity and require minimal supervisory expenses. Maintaining strong physical stamina throughout the harvest season is important if workers are to earn sufficient incomes. A piece rate system directly influences the unit cost of production and will likely increase in the future as social policies within the United States work toward increasing farm worker income. Piece rates need to be high enough to attract a sufficient number of workers and satisfy minimum wage thresholds, but low enough to maintain a viable competitive position within a crop's respective commodity market.

References

- Polopolus, L., R. Emerson, N. Chunkasut, and R. Chung. 1996. *The Florida Citrus Harvest: Prevailing Wages, Labor Practices, and Implications*. Final report to the Florida Department of Labor and Employment Security, Division of Labor, Employment and Training, Tallahassee, FL (297pp).
- Roka, F.M. and R.E. Emerson. 1999. Piece rates, hourly wages, and daily farm worker income. *Citrus and Vegetable Magazine* (April):10-12.

USDOL. 2008. United States Department of Labor, Employment Standards Administration, Wage and Hour Division website:

<http://www.dol.gov/eas/minwage/>.

Additional Notes:

3. Citrus trees are propagated by grafting a bud eye from a scion variety onto a rootstock. The technician performing the graft is called a "budder."
4. 50 Real paid for a "short" box, or 27 kilograms. Exchange rate during July 2008 was 1.6 Real per 1 USD.