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Local peach puree: An exploration of three processing scenarios

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In September 2020, a windstorm with gusts as strong as 112 mph swept across the Wasatch Front, causing farmers with peach orchards in Davis, Weber and Box Elder Counties to lose as much as 30% of their annual peach crop¹ - an estimated 1,019 tons overall (see Table 1). Such widespread and catastrophic wind events are relatively rare, happening only once a decade or so.² Nevertheless, the losses were significant for small farms operating on thin margins. Once a peach is knocked off the tree and hits the ground, it cannot be sold as a fresh peach. The event raised the question: is it possible to salvage otherwise edible fruit that can't be sold because of a natural disaster?

Wasted fruit is common, according to both state agriculture data and interviews with local orchard owners. Discussions with growers revealed that waste often stems from several conditions: produce being undesirable to customers, fluctuations in the market, fruit being unmarketable due to unforeseen events, and harvesting inefficiencies. A primary reason orchard owners cited for not using wasted fruit is the cost of labor to glean less desirable but still usable fruit from completely unusable fruit.

On average, 3% of Utah's annual peach harvest is wasted, equating to 134 tons of peaches statewide. Of these, an estimated 105 tons are from Box Elder, Weber and Davis counties combined. Altogether, a consistent supply of damaged peaches, as well as potentially other stone fruits, could be available every year for processing into a higher-margin value-added product if it is feasible. In years that sustain a catastrophic event like the 2020 windstorm, a processing plant may be able to scale up sales and production if they salvage higher volumes of damaged fruit.

Table 1. Peach Production in Utah (UDAF 2018)³

| Year | Cash Receipts | Acreage | Yield/acre (ton) | Price per ton | Total Prod (ton) | Total Utilized (ton) | Waste (ton) | % Waste |
|---|---------------|---------|------------------|---------------|------------------|----------------------|--------------|---------|
| 2012 | \$ 5,633 | 1,500 | 3.5 | \$ 1,080.00 | 5,300 | 5,200 | 100 | 2% |
| 2013 | \$ 5,542 | 1,300 | 4.2 | \$ 1,080.00 | 5,421.00 | 5,141 | 280 | 5% |
| 2014 | \$ 6,081 | 1,300 | 5.0 | \$ 981.00 | 6,500 | 6,200 | 300 | 5% |
| 2015 | \$ 4,197 | 1,300 | 3.0 | \$ 1,080.00 | 3,900.00 | 3,880 | 20 | 1% |
| 2016 | \$ 6,970 | 1,200 | 4.3 | \$ 1,640.00 | 5,160.00 | 4,250 | 910 | 18% |
| 2017 | \$ 4,931 | 1,200 | 2.8 | \$ 1,460.00 | 3,400.00 | 3,370 | 30 | 1% |
| Average* | | | 3.71 | \$ 1,136.00 | | | | 3% |
| Statewide Production Estimate | | 1,200 | 3.71 | \$ 1,136.00 | 4452 | 4,318 | 134 | 3% |
| Weber, Davis, Box Elder Estimate | | 916 | 3.71 | \$ 1,136.00 | 3398 | 3,296 | 102 | 3% |
| 2020 Wind Event | | | | | 3398 | | 1,019 | 30% |

Source: Hilton, J., Gentillion, J. (2018). *Utah Agricultural Statistics and UDAF 2018 Annual Report*. United States Department of Agriculture National Agricultural Statistics Service Mountain Region, Utah Field Office. https://www.nass.usda.gov/Statistics_by_State/Utah/

This paper explores the financial feasibility of processing waste peaches into a pasteurized puree under three scenarios: 1) batch processing manually in a home kitchen in compliance with cottage food laws, 2) batch processing with minimal automation in a commercial kitchen, 3) batch processing with full automation in a commercial processing facility.

These production processes were chosen to model common small food production business practices with different market potential and start-up and operating costs. For each scenario, the following considerations are included as part of the financial feasibility analysis: 1) the market, 2) the production process, and 3) the estimated volume of peaches that can be processed annually given the production process.

For all three scenarios, the cost of peaches is a major cost of production, and the sales price has a strong effect on net revenue. For scenarios one and two, labor is also a major cost of production. Peach cost, labor cost and sales volume for different marketing channels were modeled at different levels to illustrate the sensitivity of profitability to each variable, and possible upper and lower limits of profitability. The profit sensitivity analysis for each scenario is shown in the Appendix.

Market Considerations for Small and Medium-sized Producers

One reason puree was chosen as the product for these scenarios is its use as a versatile ingredient in recipes for home and commercial food preparation. It would be possible to sell either directly to consumers at market stands or at an on-farm store, as well as wholesale to restaurants, food producers and grocery stores.

This study considers markets according to each scenario's estimated volume of production. The first scenario results in an estimated volume of production too low to fulfill minimum requirements for most wholesale accounts. This scenario considers marketing only through direct-to-consumer channels.

Scenarios two and three, with automated production, result in estimated volumes of production that may be sold to wholesale accounts, so both wholesale and direct-to-consumer sales are considered.

Production Considerations

Limiting factors that we considered in the production models for the following scenarios arise from food production regulations, food safety, cold storage availability, equipment costs and the cost of peaches as an input.

The Production Process and Food Safety

Peach puree processing requires removal of the pit and peel and fine chopping to turn the flesh into a smooth, liquid texture. In these scenarios, pasteurization is also required. For farms that must comply with the FDA Produce Safety Rule, or are participating in GAP or third-party audits, fruit that falls on the ground is considered "dropped" produce and can't be sold unless it's processed to destroy bacteria⁴ (even for farms that are not subject to these regulations or certification requirements, selling dropped produce is not recommended due to food safety and business liability concerns). Processing the fruit with heat not only eliminates bacteria, but also deactivates the enzyme that causes browning on bruised or otherwise damaged fruit.

The peaches being processed in these scenarios are "freestone" varieties, which, as their name indicates, have an easily removable stone and are a softer peach grown for immediate eating. Free stone peaches are more common in Utah than firmer "cling stone" varieties that are more commonly grown as commodities for commercial processing.

Processing freestone peaches is less efficient than clingstone peaches because some flesh gets left on the pit as it's taken out, which is taken into account in these scenarios. Also, dropped peaches need to be harvested daily to maximize salvageable quality, with labor costs factored into the price of production. With higher volumes of production, cold storage is necessary to preserve the quality of fruit before processing.

Equipment Costs

Each scenario assumes a different startup cost based on the equipment purchased for automating parts of the production process. All scenarios assume the use of a machine to puree the peaches, but only Scenario 3 assumes a fully automated production process. Each scenario summary includes a table detailing the equipment costs.

Volume of Peaches

Between 2012 and 2017, average total peach yield per acre in Utah was 3.81 tons. Peach orchard acreage in Utah has been receding steadily. There were an estimated 1,200 harvested acres of peaches in Utah in 2017, with about 900 acres just in Box Elder, Davis and Weber Counties. As mentioned earlier, on average, an estimated 3% of Utah's total peach yield isn't utilized every year. Given average yield per acre, that means an estimated 105 tons of unutilized, or "waste," peaches may be available in Northern Utah counties annually. The percentage of this waste that may be purchased and processed into puree in a single season is considered for each scenario.

Each scenario also considers the estimated acreage of production from which this waste could come. Since, in 2017, about 86% of Utah peach orchards were less than 5 acres in size (Figure 1), dividing the number of acres by 5 gives a conservative estimate for the number of farms that may benefit by selling unused peaches to the processing facility in each scenario.

Finally, the ability of the production process in each scenario to scale up capacity quickly in the event of a natural disaster like the 2020 windstorm is considered.

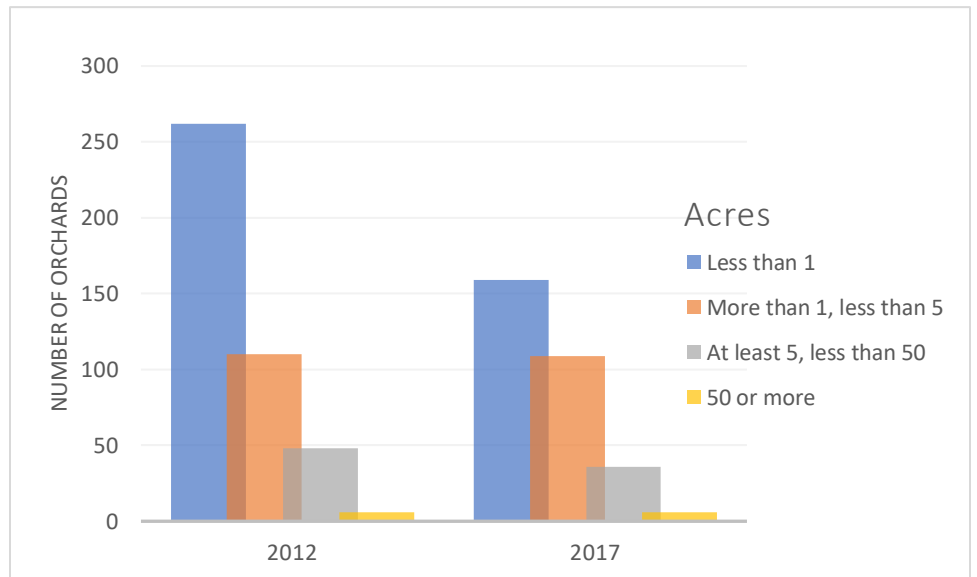


Figure 1 Peach orchards in Utah by size in 2012 and 2017 (Source: 2017 USDA Census of Agriculture)

Scenario One: Very Small Home Kitchen, Mostly Manual

This scenario represents an enterprise run by a family farm with 3 to 6 acres of peach trees. The farm has established sales directly to customers at farmer's markets and a roadside stand, and has decided to salvage waste peaches to produce peach puree for additional revenue.

Assumptions

Between 650 and 1,300 pounds of waste peaches would be utilized annually in this scenario. That represents the waste peaches from about 3 to 6 acres of peaches in one harvest season. Because most tasks are done by hand and there is no refrigerated storage capacity, this process would not be able to scale up quickly to absorb much excess loss in the event of a natural disaster.

- **Time to process:** One batch of 48 16-ounce jars of puree can be produced in 4.5 hours.
- **Production area:** A home kitchen, utilizing the existing stove and preparation surfaces.
- **Startup costs:** Purchased equipment is minimal, and no debt is assumed (Table 2B).
- **Refrigeration:** No refrigeration is necessary because each day's harvest is processed as it comes in during harvest season.
- **Pitting and peeling:** By hand using a knife.
- **Processing into puree:** A 2.5 quart Robocoupe food processor would be used.
- **Pasteurization:** The puree is heated in two 12 quart pots on the stovetop.
- **Packaging and labeling:** By hand in 16 ounce jars, with appropriate heat and cold-resistant labels.

Potential for profitability

At the lowest sales volume modeled (500 16-ounce jars annually), given base rates for the variable factors, this enterprise could generate \$3,750 in sales with over \$1,000 in after-tax profits (Table 2A). Labor and peaches are the highest cost inputs. Peaches were about 18% of sales and labor was about 20% of sales. The sensitivity of the results to changes in sales price and in the costs of peaches and labor can be found in the Appendix Table A1. The after-tax profit ranges from \$556 to \$3,245 in this scenario, accounting for 19% to 36% of sales. A family enterprise purchasing its own waste peaches and paying its own members for labor would retain an additional 45% or more of revenue above profits from sales.

Table 2A: Budget worksheet for home peach puree production facility in Utah

| Sales | Unit | Qty | Price | Total | % |
|---------------------------------|---------|-----|---------|---------|------|
| Peach puree | 16 oz | 250 | \$15.00 | \$3,750 | 100% |
| Total sales | | | | \$3,750 | 100% |
| Cost of goods sold | Unit | Qty | Price | Total | % |
| Ingredient costs | Unit | Qty | Price | Total | % |
| Peaches* | Lb | 683 | \$1.00 | \$683 | 18% |
| Total ingredients | | | | \$683 | 18% |
| Labor costs | Unit | Qty | Price | Total | % |
| Processing/packing* | Hr | 45 | \$15.00 | \$672 | 18% |
| Setup and teardown | % | 10% | \$15.00 | \$67 | 2% |
| Total Labor | | | | \$739 | 20% |
| Supplies | Unit | Qty | Price | Total | % |
| Packaging (jars, lids, labels)* | Ea | 263 | \$1.00 | \$263 | 7% |
| Cleaning supplies | | | | \$20 | 1% |
| Total Supplies | | | | \$283 | 8% |
| Total cost of goods sold | | | | \$1,704 | 45% |
| Gross income | | | | \$2,046 | 55% |
| Overhead costs | Unit | Qty | Price | Total | % |
| Administrative | % | 2% | | \$75 | 2% |
| Maintenance | % | 1% | | \$38 | 1% |
| Insurance | | | | \$300 | 8% |
| Utilities | | | | \$50 | 1% |
| Total overhead | | | | \$463 | 12% |
| Net Income | | | | \$1,584 | 42% |
| Tax | Percent | 35% | | \$554 | 15% |
| Net Income after tax | | | | \$1,029 | 27% |

* Includes overproduction of 5% to account for breakage and other loss

Table 2B: Equipment for home peach puree production facility in Utah

| Needed Equipment | Unit | Number | Cost/Unit | Total Cost |
|----------------------------|---------|--------|-----------|------------|
| Paring knife | Each | 2 | \$15 | \$30 |
| Food processor | Each | 1 | \$600 | \$600 |
| Small wares | Various | | | \$75 |
| Large pots | Each | 2 | \$100 | \$200 |
| Total Startup Costs | | | | \$905 |

Scenario Two: Small-Scale Commercial Kitchen, Some Automation

This scenario represents an enterprise run by one or more family farms with 30 to 50 acres of peach trees. The enterprise is run out of a dedicated commercial kitchen built on the property of one of the farms. They've established direct-to-consumer sales at farmer's markets and a roadside stand, as well as wholesale accounts through restaurants and grocery stores, and have decided to salvage waste peaches to produce peach puree for additional revenue.

It would be possible to rent a commercial kitchen for this scenario, although this situation was not modeled. Rental situations and costs vary widely but may be viable. At an average cost of \$50 per 4 hours, or as much as \$75 per batch including time to set up and clean up, kitchen rental could cost \$2,000 to \$3,000 annually, not including transportation costs.

Assumptions

Between 6,500 and 10,400 pounds of waste peaches would be utilized annually in this scenario, representing the waste peaches from about 30 to 50 acres of peaches in one harvest season. With some refrigerated storage capacity, this process could absorb some excess loss in the case of a natural disaster.

- **Time to process:** One batch of some combination of 10 5-pound or 27 2-pound packages of puree can be produced in 4 hours.
- **Production area:** A commercial kitchen built into the home, using existing wiring and plumbing
- **Startup costs:** A \$4,684 cash investment is estimated for constructing the kitchen and purchasing basic equipment (Table 3B)
- **Refrigeration:** A standing refrigerator is used to keep peaches fresh before final processing
- **Pitting and peeling:** By hand using a knife
- **Processing into puree:** A 5 pound capacity Hobart buffalo chopper would be used
- **Pasteurization:** The puree is heated in two 12 quart pots on the stovetop
- **Packaging and labeling:** By hand in 2-pound and 5-pound pouches, with appropriate heat and cold-resistant labels

Potential for profitability

At the lowest sales volume modeled (700 5-pound and 750 2-pound pouches annually), given base rates for the variable factors, this enterprise could generate \$32,812 in sales with over \$6,850 in after tax profits (Table 3A). Labor and peaches are the highest cost inputs, each at about 21% of sales.

The sensitivity of the results to changes in sales price and in the costs of peaches and labor can be found in Appendix Table A2. The after-tax profit ranges from \$2,117 to \$20,540 in this scenario, accounting for 9% to 30% of sales. Profit is lower than in Scenario One because although sales volume is higher, overhead costs are also higher. A family enterprise purchasing its own waste peaches and paying its own members for labor could retain more than 50% of revenue above profits from sales.

Table 3A: Budget worksheet for small-scale commercial peach puree production with minimal automation in Utah

| Sales | Unit | Qty | Price | Total | % |
|---------------------------------|------|-------|----------|--------------|------|
| Peach puree | 5 lb | 735 | \$ 20.00 | \$ 14,700 | 61% |
| Peach puree | 2 lb | 788 | \$ 12.00 | \$ 9,450 | 39% |
| Total sales | | 1,523 | | \$ 24,150.00 | 100% |
| Cost of goods sold | Unit | Qty | Price | Total | % |
| Ingredient costs | Unit | Qty | Price | Total | % |
| Peaches* | Lb | 6825 | \$ 1.00 | \$ 6,825.00 | 28% |
| Total ingredients | | | | \$ 6,825.00 | 28% |
| Labor costs | Unit | Qty | Price | Total | % |
| Processing/packing* | Hrs | 390 | \$ 15.00 | \$ 5,850.00 | 24% |
| Setup and teardown | 10% | 39 | \$ 15.00 | \$ 585.00 | |
| Total Labor | | | | \$ 6,435.00 | 27% |
| Supplies | Unit | Qty | Price | Total | % |
| Packaging* | Ea | 1523 | \$ 1.36 | \$ 2,070.60 | 9% |
| Cleaning supplies | % | 0.25% | | \$ 80.00 | 0% |
| Total Supplies | | | | \$ 2,150.60 | 9% |
| Total cost of goods sold | | | | \$ 15,410.60 | 64% |
| Gross income | | | | \$ 8,739.40 | 36% |
| Overhead costs | Unit | Qty | Price | Total | % |
| Administrative | % | 10% | | \$ 2,415.00 | 10% |
| Depreciation | | | | \$ 936.80 | 4% |
| Maintenance | % | 1% | | \$ 241.50 | 1% |
| Insurance | | | | \$ 1,000.00 | 4% |
| Utilities + \$56/mo | | | | \$ 888.00 | 4% |
| Total overhead | | | | \$ 5,481.30 | 23% |
| Net Income | | | | \$ 3,258.10 | 13% |
| Tax | % | 35% | | \$ 1,140.34 | 5% |
| Net Income after tax | | | | \$ 2,117.77 | 9% |

* Includes overproduction of 5% to account for breakage and other loss

Table 3B: Startup costs for small-scale commercial peach puree production with minimal automation in Utah

| Needed | Unit | Number | Cost/Unit | Total Cost |
|----------------------------|---------|--------|-----------|------------|
| Room Remodel | | | | |
| Flooring | Sq ft | 100 | \$4 | \$400 |
| Paint/primer | Gallons | 4 | \$26 | \$104 |
| Shelving | Various | | | \$700 |
| Sinks | Each | 2 | \$200 | \$400 |
| Equipment | | | | |
| Standing refrigerator | each | 1 | \$850 | \$850 |
| Stainless table | each | 1 | \$250 | \$250 |
| Corer/pitter | Each | 2 | \$15 | \$30 |
| Food processor | Each | 1 | \$1,500 | \$1,500 |
| Small wares | Various | | | \$50 |
| Large pots | Each | 4 | \$100 | \$400 |
| Total Startup Costs | | | | \$4,684 |

Scenario Three: Large-Scale Commercial Process, Fully Automated

This scenario represents a fully automated enterprise run by a cooperative or a farm business. The waste peaches of 330 to 420 acres of peach trees would be utilized. The enterprise markets, transports and sells peach puree directly to the consumer at farmer's markets and roadside stands, as well as to wholesale accounts including restaurants, grocery stores and food producers. Eliminating food waste is central to the enterprise's mission and marketing strategy.

Assumptions

Between 75,000 and 93,700 pounds of waste peaches would be utilized annually in this scenario. That amount represents the waste peaches from about 330 to 420 acres of peaches in one harvest season, or 35% to 45% of the waste peaches produced annually in northern Utah. This fully-automated process could be scaled up to absorb additional waste after a natural disaster.

- **Time to process:** One batch of some combination of 43 5-pound or 108 2-pound packages of puree can be produced in 2.2 hours.
- **Production area:** A 600 square foot industrial kitchen
- **Startup costs:** A \$30,000 grant or interest-free business development loan and a \$60,000 low interest rate small business loan, financed for 72 months, for \$90,000 total in startup investment (Table 4B)
- **Refrigeration:** A 10 feet x 10 feet walk-in freezer as well as a standing refrigerator and freezer are used to keep peaches fresh at various stages of processing
- **Pitting:** An industrial peach pitting machine would be used
- **Processing into puree and peeling:** An industrial food processing machine would be used
- **Pasteurization:** The puree is heated in 2 12-gallon steam kettles
- **Packaging and labeling:** An industrial filling machine and automatic labeler on a conveyor belt would be used

Potential for profitability

At the lowest sales volume modeled (8400 5-pound and 9000 2-pound pouches annually), given base rates for the variable factors, this enterprise could generate \$345,000 in sales with \$65,427 in after-tax profits (Table 4A). Peaches and the building lease are the highest cost inputs. Peaches were 23% of sales and the building lease was 19% of sales. Labor was 3% of sales in this fully automated scenario.

The sensitivity of the results to changes in sales price and in the costs of peaches and labor can be found in Appendix Table A3. Even though labor is an insignificant cost in this scenario, labor price sensitivity was still calculated and is shown in the Appendix. The after-tax profit ranges from \$28,313 to \$182,170 in this scenario, accounting for 10% to 27% of sales. Overhead costs are once again higher than previous scenarios, so the low-end of profit possibilities are lower than in both Scenarios One and Two. Were a cooperative to purchase its own peaches and purchase a shared space for production, shared profits would increase considerably.

Table 4A: Budget worksheet for large-scale commercial peach puree production facility in Utah

| Sales | Unit | Qty | Price | Total | % |
|--------------------------------------|------|--------|------------|---------------|------|
| Peach puree | 5 lb | 8,400 | \$25.00 | \$210,000 | 61% |
| Peach puree | 2 lb | 9,000 | \$15.00 | \$135,000 | 39% |
| Total sales | | 17,400 | | \$345,000 | 100% |
| Cost of goods sold | Unit | Qty | Price | Total | % |
| Ingredient costs | Unit | Qty | Price | Total | % |
| Peaches | Lb | 78750 | \$1.00 | \$78,750 | 23% |
| Total ingredients | | | | \$78,750 | 23% |
| Labor costs | Unit | Qty | Price | Total | % |
| Processing/packing | Hrs | 649 | \$15.00 | \$9,740 | 3% |
| Setup and teardown | % | 10% | \$15.00 | \$974 | 0% |
| Total Labor | | | | \$10,714 | 3% |
| Supplies | Unit | Qty | Price | Total | % |
| Packaging | Ea | 18270 | \$1.03 | \$18,818 | 5% |
| Cleaning supplies | % | 0.25% | | \$863 | 0% |
| Total Supplies | | | | \$19,681 | 6% |
| Total cost of goods sold | | | | \$109,144 | 32% |
| Gross income | | | | \$235,856 | 68% |
| Overhead costs | Unit | Qty | Price | Total | % |
| Debt service | \$ | | \$2,000.00 | \$2,000 | 1% |
| Building Lease | SF | 600 | \$9.00 | \$64,800 | 19% |
| Depreciation | \$ | | | \$6,508 | 2% |
| Transportation | % | 10% | | \$34,500 | 10% |
| Administrative | % | 5% | | \$17,250 | 5% |
| Maintenance | % | 1% | | \$3,450 | 1% |
| Insurance | % | 1% | | \$3,450 | 1% |
| Utilities + \$56/mo | kWh | 8400 | \$0.36 | \$3,240 | 1% |
| Total overhead | | | | \$135,199 | 39% |
| Net Income (Gross - Overhead) | | | | \$ 100,656.85 | 29% |
| Tax | % | 35% | | \$ 35,229.90 | 10% |
| Profit | | | | \$ 65,426.95 | 19% |

* Includes overproduction of 5% to account for breakage and other loss

Table 4B: Equipment for large-scale commercial peach puree production facility in Utah

| Needed Property/Equipment | Unit | Qty | Cost/Unit | Total Cost | Life (Yrs) | Depreciation |
|--------------------------------|------|-----|-----------|------------|---------------|--------------|
| Peeling, destoning | Each | 1 | \$ 25,000 | \$ 25,000 | 15 | \$1,667 |
| Pureeing | Each | 1 | \$ 25,000 | \$ 25,000 | 15 | \$1,667 |
| 12 gal Steam kettle | Each | 2 | \$ 2,000 | \$ 4,000 | 15 | \$267 |
| Filling machine | Each | 1 | \$ 11,000 | \$ 11,000 | 15 | \$733 |
| Sink | Each | 1 | \$ 1,000 | \$ 1,000 | 20 | \$50 |
| Tables | Each | 5 | \$ 500 | \$ 2,500 | 20 | \$125 |
| Small wares | Set | 1 | \$ 1,000 | \$ 1,000 | 20 | \$50 |
| Label applicator | Each | 1 | \$ 2,500 | \$ 2,500 | 10 | \$250 |
| Date gun | Each | 1 | \$ 1,500 | \$ 1,500 | 10 | \$150 |
| Conveyor belt | Each | 1 | \$ 500 | \$ 500 | 10 | \$50 |
| Upright freezer | Each | 1 | \$ 2,000 | \$ 2,000 | 10 | \$200 |
| Upright Fridge | Each | 1 | \$ 2,000 | \$ 2,000 | 10 | \$200 |
| Walk-in freezer | Each | 1 | \$ 10,000 | \$ 10,000 | 10 | \$1,000 |
| Shelving | Set | 1 | \$ 1,000 | \$ 1,000 | 20 | \$50 |
| Pots to transfer out of kettle | Each | 5 | \$ 200 | \$ 1,000 | 20 | \$50 |
| Total Startup Costs | | | | \$ 90,000 | | \$6,508 |

Conclusion

This was just a first look at the potential profitability of on-farm processing of fruit. We just considered processing peaches, but other fruits could potentially be processed in the same facility, which could improve profitability.

With relatively low startup costs, scenarios one and two represent opportunities to test the market for a new product with relatively little risk and likely profit potential. Scenario three explores a situation in which expensive equipment can produce larger volumes, but startup costs are considerable and fixed overhead costs are the highest cost of production. To be profitable, this riskier enterprise would require steady customers, perhaps through sales channels that have been built incrementally by lower-risk operations like those in the first two scenarios.

In all three scenarios, a significant cost of the product is peaches, so profit potential is highest for a family or cooperative enterprise owned by peach growers. It may be possible through on-farm processing to produce less food waste, more farm revenue, and a fresh, local product available to consumers who value both the farm and the food.

Appendix A – Sensitivity of Profit

Certain factors significantly affect the estimated profitability in each scenario. The levels of each factor would depend on the individual situation and the market. A base rate was established for each factor, and each scenario was modeled with each factor at different rates to see how those changes affected profitability. The factors were modeled at 1) the base rate, 2) 20% less than the base rate, and 3) 20% greater than the base rate. As each factor was analyzed, the other two factors were fixed at the base rate. An explanation is given below for each factor.

Cost of peaches. While further research is needed to understand the market for Utah peaches in detail, it is known from informal interviews that they are usually sold directly to consumers as “premium” peaches. The average price of half bushels of peaches at stands along Highway 89 was \$2 in an informal sample taken in early September 2021. In these scenarios, the peaches used have been dropped or for other reasons would not be used. The base price for ½ bushel of these peaches used is \$1/lb. The low rate is 80 cents and the high rate is \$1.20. The cost of labor to pick up and sort these peaches was calculated to be .20/lb, given a pay rate of \$15/hr. In Scenario One, the low price of peaches is 20 cents, just accounting for the cost of labor.

Cost of labor. The cost of unskilled labor is increasing as Utah is experiencing a very low unemployment rate. The base rate for labor is \$15/hr in these scenarios, with a low rate of \$12/hr and a high rate of \$18/hr. This includes any cost of employment, including employer state and federal tax contributions and benefits, if offered.

Sales Price. Prices of shelf-stable peach puree were sampled from the internet. The average price for packages smaller than 10 pounds was about \$8 per pound. The base price considered for Scenario One is \$15 for a 16 oz. jar. For Scenarios Two and Three, the base price is \$15 per 2lb package and \$25 per 5lb package, considering a “bulk” discount for the larger package. The low prices were \$12 per 2lb package and \$20 per 5lb package, and the high prices were \$18 for the 2lb package and \$30 for the 5lb package.

Sales distribution. For Scenarios Two and Three, we considered that wholesale customers would purchase 5lb packages and retail customers would purchase 2lb packages. Distribution of sales between 5lb and 2lb packages is another factor considered in profit sensitivity testing for these scenarios.

Annual units sold. For each scenario, high and low sales volumes were tested. These sales volumes were based on production capacity and expected market reach given the sales strategy in each scenario.

Table A1. Sales volume and net income* estimation of home peach puree production facility in Utah

| | Annual pints sold | |
|-----------------------------|-------------------|-------------|
| Peach Price | 500 pints | 1000 pints |
| Just Labor, \$15/hr | \$ 1,384.28 | \$ 3,009.07 |
| Base price - 1.00/LB | \$ 1,029.38 | \$ 2,299.27 |
| Base Price +20% | \$ 940.66 | \$ 2,121.82 |
| Puree Price, 16 Oz. jar | | |
| Base price less 20% | \$ 556.51 | \$ 1,353.52 |
| Base price - \$15/16 Oz jar | \$ 1,029.38 | \$ 2,299.27 |
| Base Price +20% | \$ 1,502.26 | \$ 3,245.02 |
| Labor Cost | | |
| Base wage less 20% | \$ 1,125.43 | \$ 2,491.36 |
| Base wage - 15.00/hr | \$ 1,029.38 | \$ 2,299.27 |
| Base wage +20% | \$ 933.34 | \$ 2,107.17 |

*When net income is positive, it is shown as net after deduction of an estimated 35% business and self-employment tax

Table A2. Sales volume and net income* estimation of semi-automated commercial peach puree production facility in Utah

| | Annual packages sold | | | | | |
|------------------------|----------------------|--------------|-------------|--------------|--------------|--------------|
| 5LB/ 2LB | 50/50 | 30/70 | 70/30 | 50/50 | 30/70 | 70/30 |
| Package size | | | | | | |
| 5LB (Wholesale) | 500 | 300 | 700 | 800 | 480 | 1120 |
| 2LB (Direct) | 1250 | 1750 | 750 | 2000 | 2800 | 1200 |
| Peach Price | | | | | | |
| Base price less 20% | \$ 7,737.81 | \$ 8,977.91 | \$ 6,497.71 | \$ 13,415.09 | \$ 15,399.25 | \$ 11,430.93 |
| Base price - 1.00/LB | \$ 6,850.56 | \$ 8,090.66 | \$ 5,610.46 | \$ 11,995.49 | \$ 13,979.65 | \$ 10,011.33 |
| Base Price +20% | \$ 5,963.31 | \$ 7,203.41 | \$ 4,723.21 | \$ 10,575.89 | \$ 12,560.05 | \$ 8,591.73 |
| Puree Price, 5LB/2LB | | | | | | |
| Base price less 20% | \$ 3,054.16 | \$ 3,990.55 | \$ 2,117.77 | \$ 5,921.24 | \$ 7,419.46 | \$ 4,423.02 |
| Base price - \$25/\$15 | \$ 6,850.56 | \$ 8,090.66 | \$ 5,610.46 | \$ 11,995.49 | \$ 13,979.65 | \$ 10,011.33 |
| Base Price +20% | \$ 10,646.97 | \$ 12,190.78 | \$ 9,103.15 | \$ 18,069.74 | \$ 20,539.84 | \$ 15,599.64 |
| Labor Cost | | | | | | |
| Base wage less 20% | \$ 7,687.11 | \$ 8,927.21 | \$ 6,447.01 | \$ 13,333.97 | \$ 15,318.13 | \$ 11,349.81 |
| Base wage - 15.00/hr | \$ 6,850.56 | \$ 8,090.66 | \$ 5,610.46 | \$ 11,995.49 | \$ 13,979.65 | \$ 10,011.33 |
| Base wage +20% | \$ 6,014.01 | \$ 7,254.11 | \$ 4,773.91 | \$ 10,657.01 | \$ 12,641.17 | \$ 8,672.85 |

*When net income is positive, it is shown as net after deduction of an estimated 35% business and self employment tax

Table A3. Sales volume and net income* estimation of industrial peach puree production facility in Utah

| 5LB/ 2LB | Annual packages sold | | | | | |
|------------------------|----------------------|---------------|---------------|---------------|---------------|---------------|
| | 50/50 | 30/70 | 70/30 | 50/50 | 30/70 | 70/30 |
| Package size | | | | | | |
| 5LB (Wholesale) | 6000 | 3600 | 8400 | 7500 | 4500 | 10500 |
| 2LB (Direct) | 15000 | 21000 | 9000 | 18750 | 26250 | 11250 |
| Peach Price | | | | | | |
| Base price less 20% | \$ 89,269.99 | \$ 102,875.53 | \$ 75,664.45 | \$ 123,500.09 | \$ 140,507.02 | \$ 106,493.17 |
| Base price - 1.00/LB | \$ 79,032.49 | \$ 92,638.03 | \$ 65,426.95 | \$ 110,703.22 | \$ 127,710.14 | \$ 93,696.29 |
| Base Price +20% | \$ 68,794.99 | \$ 82,400.53 | \$ 55,189.45 | \$ 97,906.34 | \$ 114,913.27 | \$ 80,899.42 |
| Puree Price, 5LB/2LB | | | | | | |
| Base price less 20% | \$ 38,691.87 | \$ 49,070.16 | \$ 28,313.58 | \$ 60,277.44 | \$ 73,250.30 | \$ 47,304.57 |
| Base price - \$25/\$15 | \$ 79,032.49 | \$ 92,638.03 | \$ 65,426.95 | \$ 110,703.22 | \$ 127,710.14 | \$ 93,696.29 |
| Base Price +20% | \$ 119,373.12 | \$ 136,205.91 | \$ 102,540.33 | \$ 161,129.00 | \$ 182,169.99 | \$ 140,088.01 |
| Labor Cost | | | | | | |
| Base wage less 20% | \$ 80,425.28 | \$ 94,030.82 | \$ 66,819.74 | \$ 112,444.21 | \$ 129,451.13 | \$ 95,437.28 |
| Base wage - 15.00/hr | \$ 79,032.49 | \$ 92,638.03 | \$ 65,426.95 | \$ 110,703.22 | \$ 127,710.14 | \$ 93,696.29 |
| Base wage +20% | \$ 77,639.70 | \$ 91,245.24 | \$ 64,034.16 | \$ 108,962.23 | \$ 125,969.15 | \$ 91,955.30 |

*When net income is positive, it is shown as net after deduction of an estimated 35% business and self employment tax

¹ ABC4.com. "Farmers on the Fruit Highway on US-89 lose crop due to wind storms, remain hopeful."

<https://www.abc4.com/news/farmers-on-the-fruit-highway-on-us-89-lose-crop-due-to-wind-storms-remain-hopeful/> Accessed Aug. 25, 2021

² Utah Hazard Mitigation. "Severe Weather: Risks and Mitigation." <https://hazards.utah.gov/wp-content/uploads/Utah-SHMP-Ch9-Severe-Weather.pdf> Accessed Sept. 15, 2021

³ Hilton, J., Gentillion, J. (2018). *Utah Agricultural Statistics and UDAF 2018 Annual Report*. United States Department of Agriculture National Agricultural Statistics Service Mountain Region, Utah Field Office. https://www.nass.usda.gov/Statistics_by_State/Utah/

⁴ FDA Food Safety Modernization Act, Pub. L. No. 111-353 (2011). <https://www.govinfo.gov/app/details/PLAW-111publ353>