



Cornell University
New York State Agricultural Experiment Station

Small Scale Processing Equipment

Fact Sheets for the
Small Scale Food Entrepreneur

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Small Scale Processing Equipment

Most food entrepreneurs start production with a manual operation that is labor intensive but adequate for small volumes. As demand for the product increases, the need to improve efficiency while maintaining quality becomes vital. A search for the right equipment is then necessary. Consider the following when deciding whether to buying equipment and what equipment is necessary.

Equipment & the Production Stage of the Business

The current production stage of a small-scale food business affects the type of equipment needed and the necessity of owning that equipment. These are listed below as they relate to equipment needs.

1. Initial market evaluation to determine the feasibility of the new food product

You have developed a product that can be produced commercially but are not yet sure about sales volume. Keep investment to a minimum; rent space and equipment. Consider manual equipment options for hand cutting, filling, and packaging.

2. Company takes off

Evaluate production demands: can you supply enough product using current procedures? Is production labor intensive? Can production steps be radically sped up by equipment? Production steps that benefit from equipment purchases include cutting, chopping, peeling, pureeing, cooking, filling, and packaging. Do you need to buy equipment or is it better to hire more personnel?

3. Solid business, ready to expand

- Evaluate the desired production volume in order to determine appropriate equipment size. In some cases, two smaller units might fit your needs better than one large piece.
- Identify the bottleneck (limiting factor in production). This should be your first equipment priority.
- Evaluate the short and long term economics of buying new versus used equipment (quality, warranty, efficiency).
- Be aware that customized equipment is much more expensive than standard units.
- Look for simplicity of operation and maintenance.
- Evaluate energy options available for energy intensive equipment such as kettles, driers and ovens.

Equipment Scale

Low volume: less than 40 pounds/day (5 gallons) - Can be done manually.

Use of manual equipment such as specialized cutters may improve speed. Typically hand filled.

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Food service volume: 50 to 150 pounds/day (10 to 25 gallons) - Look for restaurant and cafeteria type equipment

Food processing volume: more than 200 pounds/day (25 gallons)- Small-scale food processing equipment

Can be hard to find due to limited demand. Equipment is heavy duty, designed for continuous operation. The commercial motors are rated in horsepower, typically 1/4 and higher. Equipment is made of food grade materials: stainless steel is preferred due to durability and ease of cleaning. Expect to pay hundreds to thousands per unit.

Types of equipment

<i>Preparation Equipment</i>	<i>Heating/Cooking Equipment</i>
<p><u>Size reduction:</u> cutters, grinders, slicers - basically large food processors. Continuous feed is preferred, stainless steel or plastic food contact parts, FDA and/or USDA approved for food, at least 1/2 HP. Examples: vertical cutter-mixer used to chop, mix, blend, puree, or emulsify, operates normally in batch mode; shaft type mixer/cutter used to mix, puree a fixed volume, portable.</p> <p><u>Mixers:</u> dough mixers from 12 to 140 quarts. Typical brand names: Hobart, Kitchen Aid, Univex</p> <p><u>Pulper/finisher:</u> puree fruit/vegetable, separate seeds and skin</p> <p><u>Juice extractors (from puree):</u> Squeezing action. Models include hydraulic plate and frame, accordion, belt press and screw press.</p> <p><u>Peeler:</u> abrasive type is good for round homogeneous products - the typical potato peeler.</p>	<p><u>Kettles:</u> steam kettles available from 0.5 to 200+ gallons. Steam is supplied or generated in place (self-contained) by electricity or gas. Preferable options include 316 stainless steel, tilting, bottom discharge with valve, and agitator. Important to cook a full load to avoid scorching.</p> <p><u>Continuous pasteurizers:</u> rated by flow = gallons per minute. Types include tube in shell, plate, direct steam injection, UV treatment.</p> <p><u>Ovens:</u> for baking and roasting. Forced convection is faster. Combination oven/steamers are available.</p> <p><u>Fryers:</u> 10 to 40 gallon capacity is typical.</p>
	<p style="text-align: center;"><i>Cooling Equipment</i></p> <p><u>Refrigerators:</u> good temperature control. Built-in temperature indicator preferred.</p> <p><u>Freezer:</u> blast freezer for quick chilling gives best quality but is more expensive than conventional units.</p>

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Filling/Packaging Equipment

Dry products: usually filled by weight manually or with auger type fillers.

Wet products: filled by volume or weight with a variety of fillers based on product consistency. If the product is pumpable, filling can be done by gravity or using piston fillers. Capacity is given by the flow rate or containers per minute. Some units can be upgraded by adding extra filling heads.

Bag sealers: different types are available including manual, form-fill-seal, gas flushed, and vacuum sealers.

Tray/cup sealers: lid or film is heat sealed to container. Can be done manually or fully automated.

Steam or vacuum cappers: normally used for glass jars to decrease oxygen in headspace and to provide vacuum.

Summary: Evaluating the Options

- Volume must justify equipment
- Determine the most important step that limits production
- Determine capacity needed in volume per unit of time
- New versus used - warranty, condition, availability of spare parts and service, lease option
- Make sure equipment meets FDA/USDA requirements - check materials and design
- Easy to clean and service
- Consider renting space in established kitchen - complement with your own equipment
- Get at least 3 quotes for the same type of equipment
- Stay alert for auctions

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