


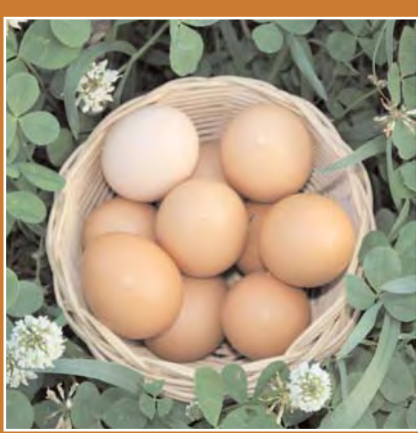

Farm Made:

A Guide to On-Farm Processing for Organic Producers

An Overview and Four Example Enterprises:

- Sorghum Syrup
- Packaged Fresh Salad Greens
- Jams, Jellies, and Spreads
- Table Eggs

by George Kuepper,
Holly Born and Anne Fanatico

2009

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ATTRA NCAT KERR CENTER ORGANIC FARMING RESEARCH FOUNDATION

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Introduction

Organic management can bring many benefits to the farm. One of these is better net income. A major contributing factor to an improved bottom line is the premium that organic commands in most markets. However, as production increases and organic products go mainstream, premiums are likely to decline, and organic farmers are likely to face the same economic pressures as their conventional neighbors. One way to avert this is by adding value to organic crops through on-farm organic processing.

The examples are really endless. Some of the more obvious include converting:

- organic wheat to organic flour
- organic peppers and tomatoes to organic salsa
- organic apples to organic apple cider
- organic okra to organic okra pickles

No doubt, adding a processing enterprise to any farm is a serious undertaking, one that requires sound research and planning. Organic farmers need to jump through the same hoops any other business person would in starting a food business, and at least one more—organic certification.

Farm-Made is intended for the organic farmer, or prospective organic farmer, who is considering adding a processing enterprise and needs to know the additional challenges and requirements that organic certification presents, as well as some of the unique opportunities.

Here we provide an overview of the general requirements for organic certification and for food processing facilities. We follow that with a discussion of four different on-farm enterprises—sorghum syrup, packaged fresh salad greens, table eggs, and canned fruit products (jams, jellies, and preserves). With each, we outline the basic production and processing requirements, and follow with details unique to organic management. A list of resources is provided in each chapter.

About the Authors

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SECTION I

Organic Certification and Food Processing: An Overview

Requirements for Organic Certification

Except for operations that sell less than $5,000 of organic products each year, all production and handling operations must be certified. (Handling entails selling, processing, and/or packaging agricultural products.) [NOP §205.2]

The first step in becoming certified is to contact a USDA accredited certifier. Certifiers either have, or can direct one to, the needed information. There is a current list of certifiers on the National Organic Program (NOP) website (see General Resources). Also see General Resources for sources of information on the certification process.

An Organic System Plan (OSP) will be required as part of the application for certification. The OSP is the management plan for the operation. It explains to the certifier what will be done to comply with the National Organic Standard (i.e., the USDA Organic Regulations). The OSP details practices and procedures, inputs and ingredients, monitoring methods, and recordkeeping system, as well as other information the certifier might deem necessary to fully evaluate the operation.

Typically, the application form one completes when applying for certification collects and organizes all or most of the information required for the OSP. An organic farm with an on-farm processing/handling enterprise will need to submit two OSPs—one for the farming or production enterprise, and one for the handling enterprise.

Exempt operations (< $5,000 in annual organic sales) are also required to develop an OSP, in the event they must demonstrate to a buyer, market manager, or government official that they are, in fact, managing organically. Kerr Center's *Small Scale Organics: A Guidebook for the Non-certified Organic Grower* features a short and convenient OSP template, as well as abbreviated recordkeeping forms (see General Resources).

Following a review of the application(s), the farm and handling operation will be inspected. If there are no major problems, certification will be granted, though it is often contingent on correcting small non-compliances identified by the certifier. OSPs must be updated every year, and inspections also re-occur annually. ATTRA's Preparing for an Organic Inspection: Steps and Checklists is recommended (see General Resources).

The annual costs of certification vary with the size and complexity of the operation(s), as well as the individual certifier. It is wise to shop around and ask a lot of questions. For guidance, read *How to Choose an Organic Certification Agency* from the Midwest Organic and Sustainable Education Service (MOSES). (See General Resources.) Also be aware that there are two different federal programs that can reimburse some of the costs of certification. The certifier will know which programs are available and how to apply in a given state. Be sure to ask!

Organic Processing/Handling

In general, organic processing/handling requires:

• the use of organic agricultural ingredients, produced either by the organic processor/handler or by another certified grower. Allowed ingredients from the Organic Program's National List of Allowed and Prohibited Substances (hereafter National List) may also be used (see General Resources).

• only allowed processing or handling procedures and methods. These include: "…cooking, baking, curing, heating, drying, mixing, grinding, churning, separating, extracting, slaughtering, cutting, fermenting, distilling, eviscerating, preserving, dehydrating, freezing, chilling, or otherwise manufacturing and includes the packaging, canning, jarring, or otherwise enclosing food in a container." [NOP §205.2] Irradiation is prohibited, as is the use of genetically-engineered organisms as ingredients or processing aids. [NOP §205.105]

• management and procedures that prevent contamination with prohibited substances and/or commingling with nonorganic products.

• proper recordkeeping and audit control procedures.

These requirements will all be addressed during the process of certification. The certifier will point out any non-compliances that need to be corrected.

Food Processing Facilities

General Requirements

Any facility where food is processed must meet federal guidelines for such facilities. In most cases, however, the state health department is responsible for inspection, licensing, and enforcement. There will be many regulations that are enterprise-specific; however, some generalizations can be made:

• All food products produced for the public must be prepared in an approved state-licensed facility.

• Because living quarters must be physically separate from food preparation areas, home kitchens can rarely be licensed.

• Adequate water and sewer capacity must be available, as well as proper sanitation facilities for anyone working in the facility.

• Needed processing equipment should have NSF (National Sanitation Foundation) certification or its equivalent.

• The processing area—floors, walls, and equipment—must be easily cleaned.

• Access must be controlled to restrict pets, children, and casual visitors.

• Pests and rodents should be excluded or otherwise controlled.

• A HACCP (Hazard Analysis Critical Control Points) plan should be considered. A HACCP plan establishes where problems with food safety are most likely to occur, and protocols for prevention. HACCP plans are required where meat and seafood are processed.

• If the operation falls within city limits, zoning regulations may limit or prevent setting up a processing facility.

• The Bioterrorism Act, passed after 9/11, requires all food manufacturers to register with the Food and Drug Administration (FDA). Details are on the FDA website at www.access.fda.gov.

• Recordkeeping is critical, including a proper audit trail with a lot and/or batch numbering system.

Organic Requirements

• All facilities that are part of the organic handling operation must be identified in the OSP and be covered in the annual inspection.

• Unless an intervening event such as a clear water rinse or the proper passage of time serves to remove residues of a prohibited cleaner, sanitizer, or other substance, such materials may not be used. Alternatively, chlorine materials, ozone, and other materials on the National List under §205.605 may be employed.

• Pest and rodent management must begin with preventive practices, such as sanitation and screen barriers. Where these are not adequate, mechanical methods such as traps and repellents may be used. Should these practices also be inadequate, nonsynthetic or synthetic pesticides on the National List may be used. As a last resort, otherwise prohibited materials may be used if applied in a manner that precludes contamination of organic ingredients or products, and the OSP is properly updated. Details on facility pest management are under §205.271 of the National Organic Standard.

It is recommended that every food production facility have a HACCP plan, which identifies critical control points where food safety can be compromised. Likewise, every organic facility should identify "organic" control points. Organic control points are specific circumstances or locations where organic integrity can be compromised by contamination or commingling. Protocols for ensuring organic integrity at these points should be established and become standard operating procedure.

Labeling

General Requirements

As with the licensing of facilities, labeling regulations are overseen by the state health department. All product labels must address the "big five:" 1) name of the product, 2) ingredients, 3) net quantity, 4) manufacturer name and address, 5) allergen statement. The state health department can provide the necessary information on all of these requirements. (Hint: Have the health department review the label before printing in volume!)

Organic Requirements

There are four levels of organic labeling allowed under the National Organic Standard. In summary, these are:

I. *100% Organic.* May be used when the product contains 100% organically produced ingredients, not counting salt and water.

II. *Organic.* May be used when the product contains a minimum of 95% organic ingredients, not counting salt and water. The remaining 5% may only be comprised of substances allowed on the National List under §§205.605–205.606, and may not include sulfites.

III. *Made with Organic Ingredients.* May be used when the product contains at least 70% organic ingredients, not counting salt and water. The remaining 30% may be comprised of nonorganically produced agricultural ingredients and/or substances on the National List under §§205.605–205.606, but may not include sulfites.

IV. *Listing organic ingredients on the ingredient statement.* Products having less than 70% organic ingredients, excluding salt and water, may indicate specific organic ingredients on the ingredient statement.

Labeled products in categories I, II, & III, must:

• have ingredient statements when the final product is comprised of more than one ingredient.

• NOT identify salt or water as organic.

USDA Organic Seal

• include a statement "Certified by [Certifying Agent]. This statement must be placed below the name and address of the manufacturer.

Only *100% Organic* and *Organic* (categories I & II) may use the USDA organic seal on the label.

Full details on labeling requirements are in the National Organic Standard under §§205.300–205.311. A summary is available on the NOP website at: www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELDEV3004446&acct=nopgeninfo

General Resources

Organic, General

National Organic Program (NOP)
Barbara Robinson (Acting Director),
Deputy Administrator
USDA-AMS-TMP
Room 4008-South Building
1400 Independence Avenue, SW
Washington, DC 20250-0020
Tel: 202.720.3252
Fax: 202.205.7808
Email: NOPAQSS@usda.gov
www.ams.usda.gov/nop

Behar, Harriet. 2007. What Is Organic Agriculture? MFS 612. MOSES, Spring Valley, WI. February. www.mosesorganic.org/attachments/productioninfo/fswhatis.html

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ATTRA's "Organic System Plan Guides." ATTRA. Call 800.346.9140.

> *At the time of this writing, NCAT/ATTRA is drafting three guides illustrating how to complete an organic system plan. Guides are being written for cropping farms, market gardens, and mixed livestock operations. The livestock guide includes an example OSP for a table egg operation.*

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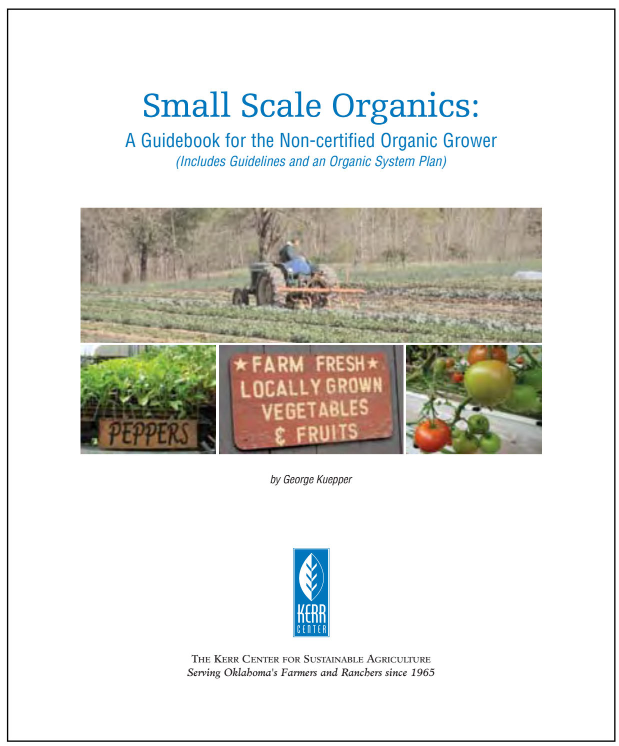

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National Organic Program. The National List of Allowed and Prohibited Substances www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5068682&acct=nopgeninfo

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Labeling

Anon. 2003. Labeling Packaged Products. USDA National Organic Program, Washington, DC. January. www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELDEV3004323&acct=nopgeninfo

Scott, Darren D., Timothy J. Bowser, and William G. McGlynn. November 2005. Food Product Labeling Basics. FAPC-140. Oklahoma State University, Stillwater, OK. pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-3020/FAPC-140web.pdf

Section II: **Four Enterprises**

Introduction

This section provides a brief look at four on-farm processing enterprises and the specific challenges to making them organic.

The enterprises—sorghum syrup, packaged fresh salad greens, table eggs, and jams, jellies and spreads—were selected for a variety of reasons. Chief among them is their suitability to on-farm processing. In each case, the steps from production to processing are straightforward and manageable for small- and mid-sized organic farms.

Another reason for selecting these four enterprises is their innate diversity, which yields a wide array of circumstances, challenges, and examples for discussion—most of them common to a host of other possible enterprises.

SECTION II, **ENTERPRISE 1**

Sorghum Syrup

by George Kuepper

Sorghum Syrup: The Basics

What is sorghum syrup?

Sweet sorghum syrup is made from the sugar-rich juice of a particular type of sorghum (*Sorghum bicolor* (L.) Moench) called sorgo, sorghum cane, or simply, sweet sorghum. Sorgo stalks are crushed to release the juice, which is cleansed of impurities and concentrated by cooking in open pans. The result is a clear, amber-colored, mild flavored syrup. Unlike molasses, which is a by-product of sugar manufacturing, sorghum syrup retains all of its natural sugars and nutrients.

How is it used?

Sorghum is a versatile sweetener. It is often used as table syrup—poured directly over pancakes, biscuits, or bread. Sorghum syrup is also a nutritious cooking ingredient. Usually, 2/3 cup of sorghum substitutes for a cup of sugar; it can be substituted cup for cup in recipes that call for molasses, honey, corn syrup, or maple syrup, such as desserts, breads, and sauces. For further information about sorghum syrup—what it is, where to buy it and how to use it—contact the NSSPA, National Sweet Sorghum Producers and Processors Association (see Sorghum Resources).

Regional adaptation

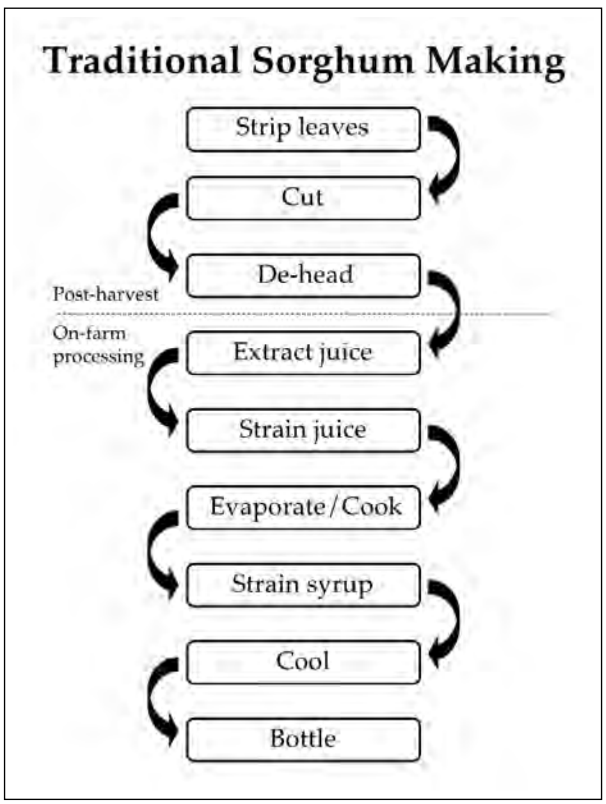
Sorghum syrup is a tradition in the lower Midwest and the Southeast, where Kentucky and Tennessee remain the leading states in production. In recent decades, however, the enterprise has expanded northward, with commercial production reaching into Wisconsin and Minnesota.

Farm production basics

Sweet sorghum plants resemble corn. Both are tropical grasses and resemble each other when immature. Differences appear at flowering. Whereas the male (tassel) and female (silks) flower parts grow on different parts of the corn plant, they are combined on the sorghum plant. The resulting seed in a sorghum plant is produced in a panicle at the top of the stalk, as opposed to the side-borne ears of corn.

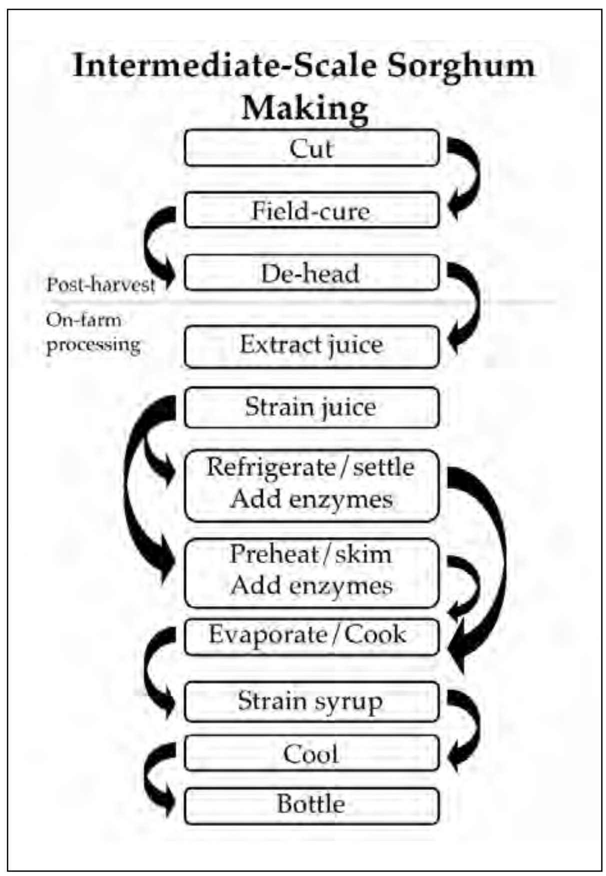
Sorghum and corn are also cultured similarly. In fact, field operations up until harvest are almost identical. Harvesting sorghum for syrup, however, is quite different. All the harvestable juice is in the stalks and the options for harvest are usually dictated by the level of mechanization employed by the farmer.

The level of harvest mechanization varies with the size and capitalization of each farm. On very small, traditional operations, workers hand-strip leaves from the standing canes using wooden slats or sticks. (Crushing or milling green leaves along with the stems may impart off-flavors to the syrup.)

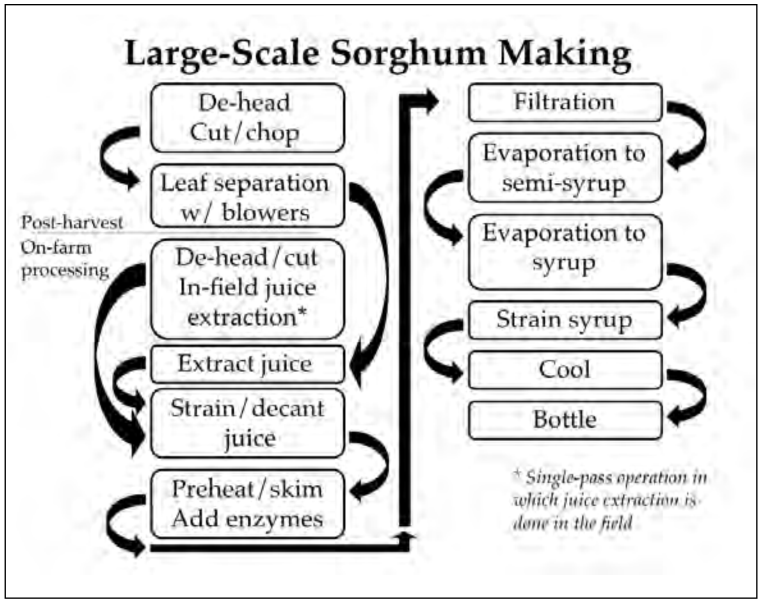


After stripping, farmers hand-cut and remove the seed heads. (Unless they can be collected as livestock fodder, leaves and seed heads are typically left in the field or otherwise discarded before the stalks are milled. Sweet sorghum is often harvested when seed heads reach the soft-dough stage, which is generally too immature for grain to be dry-stored.)

Intermediate scale operations often rely on archaic row-binders that cut and bundle un-stripped sorghum cane. Bundles are left in the field for several days to allow leaves to dry and speed the desirable transformation of sucrose into simpler sugars that do not readily crystallize. Seed heads must still be topped before milling. A cutter-bar or rotary mower offset-mounted on a front-loader tractor bucket can lop off seed heads just ahead of the row binder. Alternatively, bundles can be topped individually in the field or when stacked on a wagon using powered hedge trimmers or a chainsaw. The difficulty with this approach is the ever-dwindling number of working row-binders—technological marvels that are no longer being manufactured in the United States.

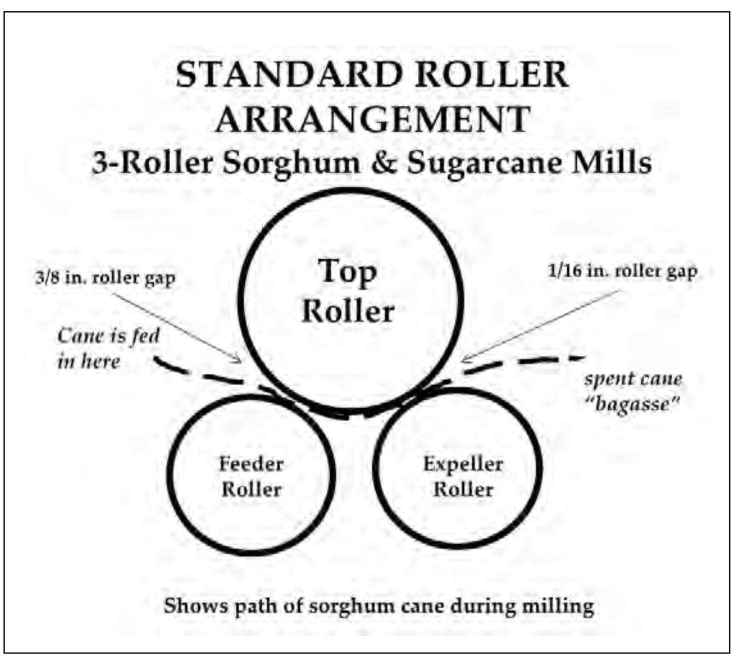


Highly mechanized operations usually choose one of two options. The first entails the use of a modified forage chopper to harvest the un-stripped cane. Modifications usually include removing some chopper blades to ensure that stem joints are longer. The cut sorgo will be then passed over screens and blowers at the mill to remove the leaves prior to milling. A second approach involves farm-engineered single-pass equipment that cuts and mills in the field. Since green leaves are crushed using this method, additional attention to processing is required to ensure good quality syrup. In both instances, cane is usually topped ahead of cutting using either a bucket-mounted mower, like intermediate-scale farmers use, or some other alternative.



Farm-scale processing basics

Sorghum syrup continues to be made primarily on-farm. Even larger processors grow most, or all, of the crop they process. And as suggested by the different levels of harvest mechanization, scales of commercial processing range from very small to quite large.



Milling—the crushing of sorgo stalks to express juice—is the primary step in processing. Small- and intermediate-scale farms typically use refurbished sorghum and sugarcane mills that were manufactured in the early and middle decades of the 20th century.

The majority of on-farm mills feature three rollers (see figure at left). These are arranged either horizontally or vertically. Most vertical mills are small and were designed to be powered by draft animals. Most producers, however, have adapted them for small engine or tractor drive. (While the number of small mills is also dwindling, the machinery is less complex than row-binders and easier to refurbish and maintain.)

After crushing, sorghum juice is strained to remove large contaminants. It may be cooked immediately, but *settling* for a short time is common and encouraged. Settling helps clarify the juice and results in a higher quality syrup.

It is often desirable to hold and settle juice for several hours—even overnight—in order to ensure enough for an efficient round of cooking. Holding juice prior to cooking can be done in two ways. It can be either refrigerated, or pre-heated and stored at 190°–205° F until cooking. Either method allows for effective settling and permits the addition of alpha-amylase enzymes that assist in breaking starches down into sugars. This prevents the problem of syrup gelling in the container. Pre-heating typically requires steam, and therefore, an on-site boiler. (Once one makes the leap to installing a boiler, it dictates how cooking will be done.)

Mule-powered sorghum press

Converting juice to syrup is fundamentally a process of evaporation. Water is "boiled off" to thicken the juice. It takes from 6 to 12 gallons of juice to make one gallon of finished syrup. The better quality syrups are made on relatively shallow pans with a large surface for rapid evaporation. The less time that juice or syrup is exposed to heat, the lighter and more attractive the product color will be.

While all manner of cooking vessels can be used, the most common style of sorghum cooker is the continuous-flow evaporator. Also common are batch pans and a unique form of continuous flow evaporator called a "Stubbs" pan. Small operations will typically use only one type of pan. Larger, more complex operations may use a mix of pan types. For example, a semi-syrup might be prepared in a Stubbs pan, then transferred to a continuous flow pan for finishing.

Bottling is often done immediately after cooking, while the syrup remains hot. This is commonly done to ensure a sterile product and to achieve a natural vacuum seal on the container. However, since microorganisms cannot grow on properly prepared syrup, hot packing is not necessary.

When sorghum syrup is stored for a long period of time, it can crystallize in the same way that honey does. Crystallization occurs when there is a high concentration of sucrose sugar in the final product. Processors sometimes add invertase enzymes to prevent crystallization. The enzyme converts sucrose to glucose and fructose sugars. It is added to finished syrup prior to bottling; it works slowly in the container over a period of several weeks.

For more detailed descriptions of sweet sorghum production and processing, see *Sweet Sorghum Culture and Syrup Production* by Mask, *Production of Sweet Sorghum for Syrup in Kentucky* by Bitzer, *Processing Sweet Sorghum for Syrup* by Bitzer and Fox, *Sweet Sorghum Production and Processing* by Kuepper, and the DVD *Sweet Sorghum Syrup Production* (see Sorghum Resources).

Organic Production Issues

Cultural requirements

Crop rotations and fertility. There is a persistent myth among old time producers that good quality syrup can only be made from cane grown on poor soil. It is true that syrup quality will suffer when there are excess nitrates in the soil. Under organic management, this suggests care in several areas of fertility management.

For example, excess soil nitrates can easily accumulate following plowdown of pure legume stands. If forages or cover crops precede a sorghum planting, they should contain no more than 50% legumes. Otherwise, sweet sorghum can be grown successfully following most crops. It is also risky to apply fresh manure prior to planting the crop. Manure often contains excess nitrates. If used, it is best applied to some other crop in the rotation.

Sweet sorghum also has a reputation for being "hard on soil." Two factors contribute to this. First of all, sorghum is rather drought-tolerant. This characteristic is partly due to the crop's ability to forage and extract more moisture from the root zone than most agronomic crops. This can leave subsequent crops thirsty under dryland conditions. Second, sorghum residue has a high carbon-to-nitrogen ratio. It can lock up soil nitrogen somewhat longer than other plant matter after it is tilled into the soil. That said, most other farm crops can be planted after sorghum without particular problems.

Seed selection & sourcing. At this time, it is challenging to find organic seed of any sweet sorghum varieties. Seed may be available from farmer cooperatives and local seed suppliers, but the selection of varieties is usually limited. Growers in the South and Midwest commonly buy untreated seed from MAFES Foundation Seed Stocks; many save seed for subsequent seasons.

Heritage varieties are becoming easier to find as there are a growing number of heirloom seed companies. Some excellent sources include Sand Hill Preservation Center, Baker Creek Heirloom Seeds, and Native Seeds/SEARCH (see Sorghum Resources for seed sources).

There are currently no genetically-engineered sweet sorghum varieties. It is unlikely that seed companies will invest in their development soon, unless interest in sweet sorghum-based ethanol balloons.

It is not common practice to coat sweet sorghum seed with fungicides or other prohibited materials. There is one exception, however. Some sorghum seed—especially for modern varieties like "Topper 76-6," "Dale," and "Theis"—may be treated with Concep III—a chemical protectant for use with herbicides containing S-metolachlor. Seed treated with Concep III or similar protectants are usually special ordered and treated seed is easy to identify and avoid.

Weed management. Weed control in sweet sorghum is similar to that used in corn, only a bit more challenging. Sorghum is smaller-seeded and slower to emerge than corn. Therefore, it is a bit slower to develop a weed-suppressive canopy. Once a canopy is established, though, sweet sorghum grows tall and does an excellent job out-competing mid- and late-season weeds.

Cultivation options are similar to corn, though they may be timed a bit later due to sorghum's slower emergence. Blind cultivation with a rotary hoe, spike tooth, or flex-tine weeder can be tried, though caution is warranted. Because sorghum is small-seeded, blind cultivation can take a higher toll than it does on corn. An excellent guide to cultivation tools and their use is S*teel in the Field* by Greg Bowman (see Sorghum Resources).

Delaying planting to give sorghum a competitive edge on weeds is generally a sound strategy. However, it may increase susceptibility to disease and may not be a good idea for many heirloom varieties.

Innovative growers began experimenting with transplanting in the 1980s, using the same equipment used for tobacco. This strategy gives the crop a head start and is a great boon to weed management. Details are outlined in the University of Kentucky DVD *Sweet Sorghum Syrup Production* (see Sorghum Resources).

Pest and disease management. Most sorghum diseases and insect pests are manageable using resistant varieties and good organic cultural practices. Heirloom varieties, however, may not show the same level of resistance and tolerance. Insecticides and fungicides are rarely used in conventional production, and allowed products would probably not be efficacious or economical for organic production either.

As with corn, delayed planting is one of the tools that can be used for weed management. However, late planting also increases susceptibility to diseases.

Another consideration in disease management is the presence of johnsongrass—a perennial relative of sweet sorghum that is an alternate host for diseases. Conventional growers are advised to clear johnsongrass from adjacent fields and borders. This is not easily done even with conventional herbicides. Organic growers may, however, keep johnsongrass mowed on a schedule that reduces the development and spread of disease spores.

Organic Processing Issues

Juice extraction (Milling)

Conventional practices used in milling sorghum cane are acceptable under organic management and there are few organic control points. Food-grade grease must be used to lubricate open gears and bearings. While these materials are synthetic, they do not need to be on the National List. They are not food or processing ingredients. They are manufactured as "food-grade" mainly as a safety measure in the event of accidental contamination. In practice, every effort must be made to ensure that lubricants do not contact the cane or the juice. Food-grade lubricants are widely available (see Sorghum Resources).

Cleaning is usually done with a water spray. If synthetic cleaning and disinfecting agents are used, they should be followed with a water spray to remove any residue. Chlorine products are commonly employed. As a general rule, certifiers allow most standard cleaning agents if residues are effectively removed via clean water rinsing. This will be true at a number of organic control points in sorghum making. When synthetic cleaners or other agents not on the National List are used in contact surfaces, an "intervening event" such as a clean water rinse must be used to remove any contaminating residues before organic crops can be processed.

While this is not specifically an organic issue, the use of draft animals to power the sorghum mill should be mentioned. State regulations may or may not permit using horses, mules, or oxen for milling, due to contamination hazards from dung, dust, dander, etc. While using draft animals may be an excellent agri-tourism marketing tool, be certain to thoroughly understand the restrictions and requirements involved.

Juice handling/storage

In practice, sorghum producers use a wide variety of containers to hold juice prior to cooking. Stainless steel is certainly the standard, but galvanized livestock tanks, plastic tubs, and wooden barrels are all acceptable. Similarly, stainless steel, plastic PVC, and FDA approved food grade water hoses or flexible tubing may be used to transfer juice. As with cleaning the mill, various agents, such as chlorine bleach, may be used to aid in cleaning and disinfecting storage and transfer equipment as long as a clear water rinse follows.

The care taken for cleaning mills and juice handling equipment may appear somewhat lax. However, cooking temperatures in sorghum making typically exceed 230° F. Such high temperatures eliminate most, if not all, microbial hazards that arise during the milling and juice handling stages.

Cooking

Evaporating sorghum juice to make syrup is a basic process with only a few organic control points of concern. Essentially those are the use of amylase enzymes and procedures, and the choice of materials for cleaning the evaporator pan.

Amylase enzymes. Sometimes, sorghum syrup may "gel" after bottling. Gelling results when the juice contains too much starch. Many producers control gelling by adding amylase enzymes. Amylase converts starch granules to simple sugars and dextrans. Amylase can be added to the juice at various stages, depending on how juice is handled and the cooking system that is used.

Enzyme use is an organic control point because genetically-engineered and non-GE forms of amylase are both on the market and both are widely used. It is important that the organic processor obtain a non-GE enzyme. At present, it appears that most processors buy enzymes through the NSSPPA, which provides both GE and non-GE forms. Be certain to request non-GE amylase!

Lastly, it helps to know that the starch problem can also be addressed by other means, either eliminating the need for enzymes or reducing them to a fallback measure. Some sorghum varieties, for example, are less starchy. Timely harvest can also make a difference; over-mature canes tend to yield more starch. Settling the juice for one to three hours is perhaps the most useful practice for reducing starch levels.

Cleaning the evaporator pan. After cooking is completed, about one inch of water should be left in the evaporator pan overnight. An alkaline detergent is often added to remove mineral deposits. The following morning, an acid cleaner is used to remove salt precipitates. Use non-metallic scrubbers to prevent leaving metal fragments where they might end up in the final product. Thoroughly rinsing the pan with clear water after the acid cleaning is standard practice and provides the "intervening event" preventing food contact with a prohibited substance.

However, for the extra careful, there are a number of acid-based cleaners that meet the requirements of the National Organic Program. These are commonly used in the dairy industry to clean milk lines and equipment, circumstances where intervening water rinsing is not allowed. The Organic Materials Review Institute (OMRI) may list several allowed acid-based cleaners (see Sorghum Resources).

Be certain to dispose of used cleaning solutions in a proper fashion. If they are not directed into a sewer or septic system, it is advisable to capture and dispose of them properly in a covered pit, away from surface waters and tree roots.

Syrup handling and bottling

In many cases, syrup is bottled shortly after cooking, after cooling down to about 130—140° F. There are several advantages to quick bottling while the syrup remains fairly hot. Among them is the rapid flow of the syrup, which speeds the bottling process. Packing a hot product also provides a natural vacuum seal and reduces the hazard of microbial contamination.

Traditionally, sorghum was packed for sale in four-pound metal cans. These are rarely seen anymore. Glass jars and plastic syrup bottles have largely supplanted cans. Recently, however, a number of concerns have been raised about plastic containers. Two chemicals, bisphenol A (BPA) and phthalates, contained in many grades of plastic, have been highlighted. They may be of concern when sorghum is hot-packed, as high temperatures tend to leach them from the plastic. Generally speaking, the safest plastics for food packaging appear to be the most common—those made from HDPE #1 and #2. Fortunately, the most popular plastic bottle that producers use at present is made from HDPE #2 plastic (see Sorghum Resources.)

Invertase enzymes. Like honey, sorghum may crystallize (go to sugar) in storage. This is most often a problem when syrup is stored over winter. Crystallization results when there is an imbalance among the three main sugars in sorghum—sucrose, fructose and glucose. Typically, the culprit is excess sucrose, though too much glucose can also cause "sugaring." Producers can add invertase to convert sucrose to fructose and glucose. This is done most commonly to finished syrup just prior to bottling, though invertase can also be added to semi-syrup, if making and holding semi-syrup as part of the process. The issue with invertase is the same as that discussed under amylase: care must be taken to ensure that the enzyme is not genetically engineered.

As with gelling, crystallization can also be reduced through management practices. Certain varieties, such as "Keller," have a reputation for crystallizing, and can be avoided. Cutting canes several days prior to milling, and allowing them to lie on the ground or in a stack at the mill, encourages the natural conversion of sucrose.

Labeling

The federal Food and Drug Administration (FDA) sets the basic requirements for food product labeling. There are often state-based programs available through departments of agriculture that can assist in complying with federal requirements for weights and measures and other factors. State departments of agriculture may also have additional labeling programs that can help distinguish products. The Oklahoma Department of Agriculture, Food, and Forestry, for example, has a program titled *Made In Oklahoma* that allows in-state farms and other businesses to promote and label their products accordingly.

Another labeling program of interest is provided by the National Sweet Sorghum Producers and Processors Association (NSSPPA). Concern about the abundance of "blended" and imitation "sorghum" labeled as pure prompted the NSSPPA to develop a logo that assures the consumer of a pure, unadulterated product (see Sorghum Resources).

National Organic Program (NOP) labeling requirements. Sweet sorghum syrup products that have been produced and processed organically must be properly labeled when marketed as organic. There are four levels of labeling:

1. A product may be labeled as "100% Organic" if it contains only 100% organic agricultural ingredients. Sweet sorghum syrup might be labeled "100% Organic" if NO enzymes, other processing aids, or other non-organic ingredients are added. The USDA's organic seal may be used on products labeled "100% Organic."

2. A product may be labeled "Organic" if it contains a minimum of 95% organic agricultural ingredients. The remaining 5% of ingredients may include only those allowed on the National List. For example, sorghum that has been made using non-GE enzymes can be labeled as "Organic." The USDA's organic seal may also be used on products labeled Organic.

3. A product may be labeled "Made With Organic Sorghum" if it contains a minimum of 70% organic ingredients. The remaining 30% of ingredients may not be produced or processed using sewage sludge, irradiation, or genetic engineering. A syrup blend of sorghum and conventional sugarcane syrup might qualify for this label; a blend using conventional corn syrup likely would not, as most (if not all) conventional corn syrup comes from genetically engineered corn. The USDA's organic seal may NOT be used on products labeled "Made With Organic."

4. Products that contain less than 70% organic ingredients may identify them on the ingredients panel. For example, a loaf of bread may list its ingredients as "whole wheat flour, oat flour, wheat berries, organic sorghum syrup, rolled oats, butter, sea salt, yeast."

Additional specific requirements for organic labeling are addressed in Subpart D of the National Organic Standard §§205.300–311.

Additional regulatory issues

All food products manufactured for the public must be prepared in an approved licensed facility. In most states, licensing is overseen by the state health department. Additional approval and licensing by the state agriculture department might also be required for some enterprises in some states.

If a farm falls within the limits of a city, there may be additional zoning requirements to meet. City and/or county regulations may also apply to the construction of new facilities if those are needed. If a steam boiler is to be used, state certification will also be necessary; such certification may also require that special boiler insurance be purchased.

Sweet Sorghum Resources

General information for sweet sorghum production and processing

National Sweet Sorghum Producers and Processors Association (NSSPPA)
c/o Morris Bitzer
2049 Rebel Road
Lexington, KY 40503
Tel: 859.806.3358
Fax: 859.257.7874
mbitzer@uky.edu
www.ca.uky.edu/nssppa/

Sweet Sorghum Syrup Production (DVD),
dept.ca.uky.edu/agc/distrib/record_details.asp?ID=200

University of Kentucky educational DVD gives a 13-minute overview of sorghum production and processing.

Sweet Sorghum Culture and Syrup Production
by Paul Mask and William C. Morris.
Alabama Cooperative Extension System publication ANR-625. November 1991.
www.aces.edu/pubs/docs/A/ANR-0625/

Production of Sweet Sorghum for Syrup in Kentucky by Morris Bitzer. University of Kentucky Cooperative Extension Service publication AGR-122. November 1994.
www.ca.uky.edu/agc/pubs/agr/agr122/agr122.pdf

Processing Sweet Sorghum for Syrup
by Morris Bitzer and Joe D. Fox.
University of Kentucky Cooperative Extension Service publication AGR 123.
May 2000. www.ca.uky.edu/agc/pubs/agr/agr123/AGR123.pdf

Sweet Sorghum Production and Processing
by George Kuepper.
Kerr Center for Sustainable Agriculture
www.kerrcenter.com/publications/sorghum/sorghum.html

Sorghum seed sources

Baker Creek Heirloom Seeds
2278 Baker Creek Road
Mansfield, MO 65704
Tel: 417.924.8917
rareseeds.com

Hubert Farms
10685 E. 1700 N.
Ferdinand, IN 47532
812.719.1898
sehubert@psci.net

Source of "Sugar Drip" sorghum seed

MAFES Foundation Seed Stocks
Box 9811
Mississippi State, MS 39762-9811
Tel: 662.325.2390
Fax: 662.325.8118
msucares.com/crops/sorghum/descriptions.html

Native Seeds/SEARCH
526 N. Fourth Avenue
Tucson, AZ 85705
Tel: 520.622.5561
www.nativeseeds.org

Sand Hill Preservation Center
1878 230th Street
Calamus, IA 52729
563.246.2299
www.sandhillpreservation.com

Danny Townsend
Tel: 859.498.4142
sorghumsyrup@lycos.com
Source of seed for various sorghum varieties

Organic

National Organic Program (NOP)
Barbara Robinson (Acting Director), Deputy Administrator

USDA-AMS-TMP
Room 4008-South Building
1400 Independence Avenue, SW
Washington, DC 20250-0020
Tel: 202.720.3252
Fax: 202.205.7808
NOPAQSS@usda.gov
www.ams.usda.gov/nop

Organic Materials Review Institute (OMRI)
Box 11558
Eugene OR 97440
Tel: 541.343.7600
Fax: 541.343.8971
info@omri.org
www.omri.org

Steel In the Field: A Farmer's Guide to Weed Management Tools by Greg Bowman.
SARE Handbook Series #2. 2001.
www.sare.org/publications/weeds.htm

Labeling

Made in Oklahoma
www.madeinoklahoma.net/

U.S. Food and Drug Administration, Food Labeling and Nutrition
www.cfsan.fda.gov/label.html

HDPE #2 Plastic Sorghum Jugs

Guenther Sorghum Supply
4363 Muddy Pond Rd.
Monterey, TN 38574
Tel/Fax: 931.445.3589
petendoreen@twlakes.net

Enzymes

National Sweet Sorghum Producers and Processors Association (NSSPPA)
c/o Morris Bitzer
2049 Rebel Road, Lexington, KY 40503
Tel: 859.806.3358
Fax: 859.257.7874
mbitzer@uky.edu
www.ca.uky.edu/nssppa/
Be certain to specify non-GMO/non-GE enzymes; NSSPPA supplies both!

Food-grade lubricants

ThomasNet
www.thomasnet.com/products/grease-food-grade-35701408-1.html
Directory of suppliers of food-grade lubricants.

SECTION II, **ENTERPRISE 2**

Packaged Fresh Salad Greens (Salad Mix)

by Holly Born

Salad Mix: The Basics

What is a salad mix?

Salad mix can be made up of any combination of lettuces, leafy greens, herbs, and flowers, but usually is a mix of several types of young leaf lettuces. Salad mixes are extremely popular, relatively easy to grow, and produce marketable crops quickly, making them an attractive value-added option for the small grower.

Production basics

Growing salad mix is largely the same as growing leaf lettuce. The seedbed is prepared and the lettuces and other greens are seeded directly. Usually, but not always, the different types and varieties are sown separately, with the idea that they will be proportionately blended later on to create the final product. Depending on the types and varieties of greens planted, harvest usually occurs within 30 days since the greens are harvested young, about four to six inches tall. The main difficulty with salad mix production is staggering planting dates so that a steady supply is available throughout the season.

The lettuces and other ingredients in salad mix are usually not in the field long enough to be susceptible to many pests or diseases. Aphids and thrips are possible insect pests. Damping-off is the main fungal disease affecting young greens. Weed control is very important as young lettuces cannot out-compete weeds.

Farm-scale processing basics

The greens are harvested, depending on scale, either by hand, using a small-scale harvester, or by using a large-scale harvester. Proper post-harvest handling is crucial for product quality. The greens need to be cooled immediately after harvest, usually by immersing them in near-freezing cold water. Greens must be carefully washed and sorted. Dirty, gritty, or low quality greens are unacceptable to almost all customers.

Greens may be washed several times. When greens are completely washed, dried, and graded, they are packed and returned to a very high humidity, near-freezing environment. Usually each type of lettuce and other greens are grown and harvested separately and then mixed after they have been washed and dried. However, because salad mix has become so popular, many seed companies offer mixes designed to mature together, and with different colors and flavors. The mix can be packaged for sale after washing and drying.

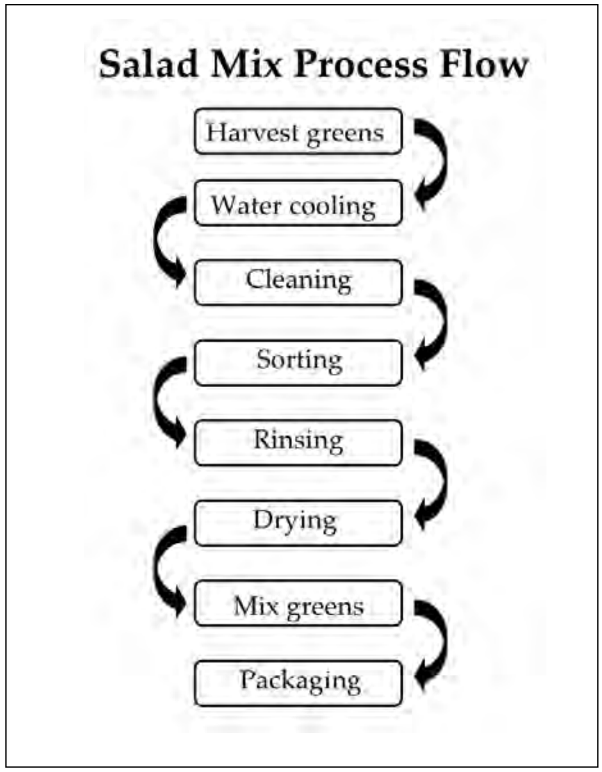
More information on harvesting, washing, spinning equipment and methods, and packaging can be found in the ATTRA publication *Specialty Lettuce and Greens* (see Salad Mix Resources).

Food safety considerations

Salad mix and other leafy greens are almost always eaten raw. Since they are often harvested by hand, hand sorted, and hand mixed and packaged, there are many points in the process where they can be touched and contaminated. Even products at final retail may be touched many times before they are eaten. Thus salad mix production and marketing poses many challenges to food safety.

While this guide focuses on post-harvest handling and packaging of salad mix, it is important to note that food safety and quality begins with choice of production site and can be affected at every step in the production and marketing chain. Attention to *all* food safety practices is especially important for a product such as salad mix that is eaten raw. Production sites must not be vulnerable to potential contamination from manure or prohibited chemicals in runoff water from neighboring sites. Every effort should be made to exclude animals from production and handling areas, and workers must practice proper hand washing.

Since salad mix is washed and cooled, water must be tested for contamination with pathogenic organisms such as *E. coli*, and reuse of wash water should be avoided to reduce cross contamination. Local health departments will advise on the types of water tests that are needed, and often test for bacteria and nitrates. The health department can also make referrals to licensed testing laboratories in the area. All equipment that has contact with the product must be cleaned and sanitized. Transportation vehicles should be inspected to be sure they are clean and sanitary. See the Salad Mix Resources section for sources of comprehensive food safety guidelines for growers and handlers of leafy greens.



Organic Production Issues

Cultural requirements

Organic growing of salad mixes follows the same general steps outlined above. However, there are some special considerations for organic production. Organically grown seed is required for organic production, but non-organically grown untreated seed may be used if the type and variety needed is not commercially available as organic. Varieties used **may not** be genetically engineered.

If manure is applied within 120 days of harvest, it **must** be composted according to the requirements of the National Organic Standard §205.203(c)(2). Specifically, animal manure and accompanying feedstocks must go through a process in which:

- The initial C:N ratio of the feedstocks is between 25:1 and 40:1; and

- A temperature between 131 - 170 °F is maintained for three days if an in-vessel or static aerated pile system is used; or

- A temperature between 131 - 170 °F is maintained for 15 days if a windrow composting system is used. During that period, the materials must be turned a minimum of five times.

Raw manure may be used if the interval between application and incorporation, and harvest, is 120 days or more. However, this may still be risky. A recent study analyzed organic and conventional vegetables grown in Minnesota for bacteriological contamination. While it found no significant differences in bacteria levels between vegetables from conventional and certified organic growers, it did find that growers who used manure or compost aged less than twelve months had vegetables with coliform bacteria levels nineteen times higher, on average, than those who used a longer aging process. [1]

Since food safety for leafy greens is so important, it may be wise to forego use of manures entirely and rely on alternative means of soil fertility such as formulated organic fertilizers or green manures—crops plowed down to improve the soil.

As mentioned earlier, salad mix greens have few pests, mainly thrips and aphids. Organic growers often use insecticidal soap to control these pests. Ideally, soap formulations should be mixed with softened or distilled water as minerals—especially calcium—in hard water reduce the spray's effectiveness. [2] There are few good organically acceptable products for controlling fungal diseases, but some of the biofungicides are effective. Baking soda may be useful, too. ATTRA is a good source for information on these topics (see Salad Mix Resources).

All inputs must be allowed for organic crop production and approved for the use intended, i.e. fertility, insecticide, disease control, etc. The Organic Materials Review Institute (OMRI) is an excellent guide to allowed materials (see Salad Mix Resources). For additional guidance, see ATTRA's *Organic Materials Compliance* in Salad Mix Resources.

Organic Handling Issues

Cleaning and sanitizing equipment

Cleaning equipment involves use of detergents to remove visible dirt and most microorganisms, while sanitation refers to elimination of the remaining microorganisms while ensuring that the organic product is not contaminated by the cleansers and sanitizers.

The chlorine based sanitizers (bleach, sodium hypochlorite, and others), peracetic acid, hydrogen peroxide, phosphoric acid, and ozone are among the sanitizers on the National List of Allowed and Prohibited Substances (see Part I, General Resources) that can be used. Peracetic acid is effective and more environmentally friendly than chlorine products, but more expensive. Ozone is most expensive but poses no risks to workers handling chemicals and leaves no residues to affect the environment.

Often, use of chemicals not on the National List, such as quaternary ammonium, iodine, and synthetic surfactants, may be allowed if followed by an "intervening event," such as a clear water rinse or the passage of time. What is important is that the intervening event be sufficient to protect organic product from contact with prohibited materials. Therefore, the grower would be expected to demonstrate that the intervening event is sufficient and would probably need to monitor for contaminating residues. Monitoring might include pH testing, or ammonium test strips (if quaternary ammonia products are used). Such testing must demonstrate that no residues remain.

The most straightforward approach is to use cleaners and sanitizers that are on the National List. Again, check with the certifier and check the OMRI guidance materials for help in determining which cleaners and sanitizers to use.

Post-harvest handling

Wash water will need to be tested for contaminants. Most certifiers will request a water test unless the water is from a monitored source that complies with the Safe Drinking Water Act. Most municipal water sources meet these standards. Sanitizers are usually used in wash water and must be on the National List as allowed for food contact surfaces if synthetic. Some commonly used sanitizers include chlorine based sanitizers as described above, hydrogen peroxide, and peracetic acid/peroxyacetic acid. The certifier will expect a plan to test the water discharged and document the results of those tests.

An excellent, comprehensive guide to post-harvest handling for organic crops is *Postharvest Handling for Organic Crops* (see Salad Mix Resources). It is highly recommended for all organic growers, but especially those growing products that are consumed raw.

Marketing

Labeling

Most salad mix will be comprised of only certified organic lettuces and other leafy greens and can be labeled "100% Organic." However, it is possible to formulate products that might have less organic content and require different labeling.

For example, products containing at least 95% certified organic ingredients can be labeled "Organic." In such cases, the remaining 5% of ingredients may include only those allowed on the National List. A product may be labeled "Made With Organic" if it contains a minimum of 70% organic ingredients. The remaining 30% of ingredients may not be produced or processed using genetically engineered organisms, sewage sludge, or irradiation.

§205.606 of the National Organic Standard is a list of nonorganic agricultural products that may be used in "Organic" products if organic equivalents are not commercially available. The grower would be expected to document a search for organic sources of these ingredients. Some organic sources §205.606 ingredients can be found at a special website maintained by the Accredited Certifiers Association and at the Organic Trade Association's Organic Pages Online (see Salad Mix Resources).

Regulatory

Federal regulation

Unless total annual organic sales are less than $5,000, an operation must become certified by an accredited certifying agent to represent its salad mix as "Organic." To locate a certifier, visit the National Organic Program's website (see Salad Mix Resources). For more information on the organic certification process and for other useful salad mix resources, visit the ATTRA website.

A question that arises with salad mix production and sales concerns the boundary between post-harvest management of a vegetable crop and processing. The distinction is important. If the activities associated with preparing salad mix for market are deemed processing (handling), the grower is required to submit an organic handling system plan as well as the organic production system plan, which is not only time-consuming, but requires additional certification fees.

Generally speaking, harvesting, cooling, and washing are recognized as post-harvest activities. If the grower then sells the product in bulk or allows customers to self-bag at the market, it might not be viewed as processing. This, however, is not a hard-and-fast rule. It will be necessary to talk with the certifier to determine where he or she draws the line.

State regulation

Regulations can vary from state to state. Most will consider salad mix a processed product and require licensing or permits if the mix is processed beyond simple trimming, for example by chopping or shredding, and/or if the product is sold as washed, "ready-to-eat." Many states will consider it an unprocessed product as long as it is labeled with the instructions to wash the product before eating. Additionally, growers may be held liable for customer problems if customers eat the salad mix unwashed. Although as detailed above growers will certainly be thoroughly

washing the salad mix, they may want to protect themselves by making sure that product labels and all printed materials specify that customers must wash the product before eating.

Liability insurance

Growers will probably want to carry some food product liability insurance. In fact, many farmers' markets and most retailers require proof of such insurance. Insurance companies may be able to work with food product liability insurers, or direct growers to sources of such insurance. Many small producers have obtained food product liability insurance at very affordable rates through their local Farmers Union or Farm Bureau.

Packaged Fresh Salad Greens (Salad Mix) Resources

Production and post-harvest

Kuepper, George, Janet Bachmann, and Raeven Thomas. 2002. Specialty Lettuce & Greens: Organic Production. CT117. ATTRA, Fayetteville, AR. attra.ncat.org/attra-pub/lettuce.html

Other ATTRA publications on organic vegetable production. Available free of charge. Call 800.346.9140, or visit www.attra.ncat.org/organic.html#vegetable. Publications include:

- Resource Guide to Organic and Sustainable Vegetable Production
- Scheduling Vegetable Plantings for Continuous Harvest
- Organic Market Farm Documentation Forms
- Season Extension Techniques for Market Gardeners
- Organic Crop Production Overview
- NCAT's Organic Crops Workbook – A Guide to Sustainable and Allowed Practices
- Suppliers of Seed for Certified Organic Production
- Postharvest Handling of Fruits and Vegetables
- Use of Baking Soda as a Fungicide
- Thrips Management Alternatives in the Field

Suslow, Trevor. No date. Postharvest Handling for Organic Crops. Organic Vegetable Production in California Series. University of California Publication No. 7254. anrcatalog.ucdavis.edu/pdf/7254.pdf

Organic

National Organic Program (NOP)
Barbara Robinson (Acting Director),
Deputy Administrator
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Fax: 202.205.7808
NOPAQSS@usda.gov
www.ams.usda.gov/nop

Organic Materials Review Institute (OMRI)
Box 11558
Eugene OR 97440
Tel: 541.343.7600
Fax: 541.343.8971
info@omri.org
www.omri.org

Baier, Ann, and Lance Gegner. 2008. Organic Materials Compliance. IP313. ATTRA, Fayetteville, AR. 8 p. www.attra.ncat.org/attra-pub/PDF/organicmaterials.pdf

Food Safety

Gorny, James R. (Editor-In-Chief). 2006. *Commodity Specific Food Safety Guidelines for the Lettuce and Leafy Greens Supply Chain.* Produce Industry Groups: International Fresh-cut Produce Association, Produce

Marketing Association, United Fresh Fruit and Vegetable Association, and Western Growers.
www.cfsan.fda.gov/~dms/lettsup.html

Commodity Specific Food Safety Guidelines for the Production and Harvest of Lettuce and Leafy Greens, the guidelines for the Leafy Green Product Marketing Agreement member program, are available at www.caleafygreens.ca.gov/members/resources.asp

Small-Scale Harvesting Equipment

Johnny's Selected Seeds
955 Benton Ave., Winslow, ME 04901-2601
Tel: 877.564-6697
Fax: 800.738.6314
rstore@johnnyseeds.com
www.johnnyseeds.com

Organic Ingredients

Organic sources for agricultural ingredients listed on NOP § 205.606.
A website sponsored by the the
Accredited Certifiers Association (ACA).
www.606organic.com

Organic Pages Online.
Organic Trade Association
P.O. Box 547
Greenfield, MA 01302
www.theorganicpages.com

SECTION II, **ENTERPRISE 3**

Jams, Jellies, and Spreads

by Holly Born

Jams, Jellies, and Spreads: The Basics

What are jams, jellies, and spreads?

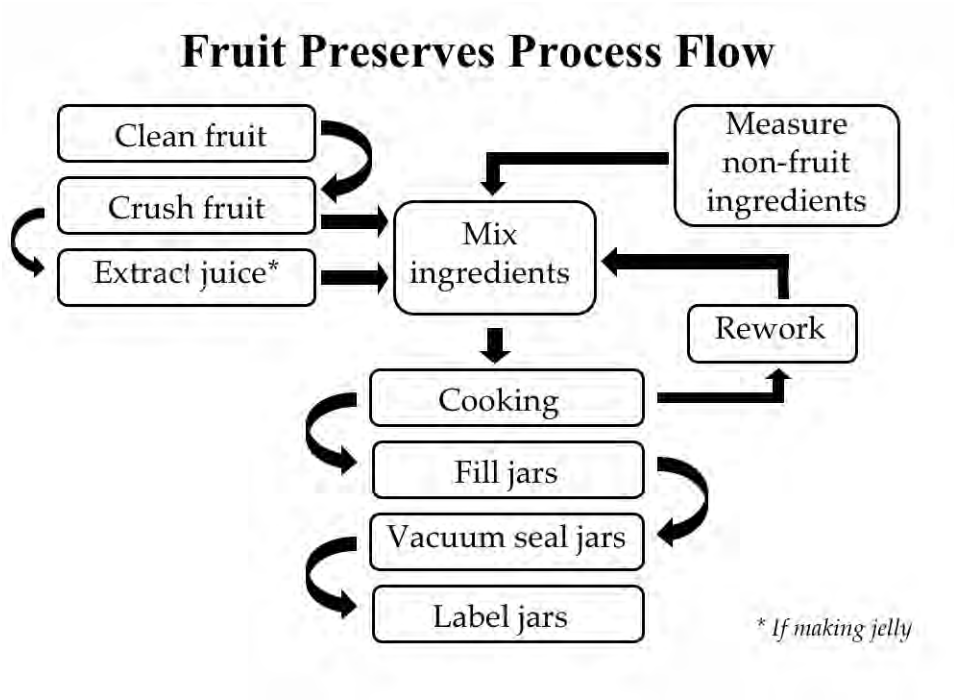
Fruit growers can extend the season by offering their customers products such as jams and jellies. These products are relatively simple to produce and have very good shelf life. Jellies and jams are low-risk foods from a food safety perspective because of their high sugar and high acid content. As long as they are protected from air, jams and jellies with adequate soluble solids and acid can be preserved with minor heat treatment. However, molds can still grow in them, so they must be sealed to prevent mold, as well as moisture loss and oxidation.

These products will collectively be referred to as "spreads" unless the specific type is meant. "Jelly" is strictly defined in the United States as, "that semisolid food made from not less than 45 parts by weight of fruit juice ingredient to each 55 parts by weight of sugar." A jam is similar to a jelly except that the crushed or pulped fruit ingredient is used rather than the juice. The fruit is cooked until it is concentrated to about 68% solids. At least 45 parts of fruit are required for each 55 parts of sugar.[3] "Preserves" are like jam but with larger chunks of fruit; "conserves" are a mix of fruits and sometimes other ingredients.

Sugared jam and jelly sales have been declining overall. However, the market for organic, all-fruit, and low-sugar spreads is growing. All of these are attractive to buyers of organic food who prefer to avoid the high levels of refined sugar in jams and jellies.[4] These low-sugar spreads are often sweetened with cane juice, agave, or most commonly with fruit juice concentrate. Buyers of these types of spreads tend to prefer a very high percentage of fruit and a natural fruit taste and texture.

Crop production basics

It is beyond the scope of this publication to cover production of the many types of fruits (and even vegetables and herbs) that can be used to make spreads. However, fruit can be grouped by how much pectin it contains, and this in turn determines processing needs. Fruits containing enough natural pectin to form a gel include crab apples, tart apples, sour blackberries, sour boysenberries, most plums, cranberries, lemons, and wild grapes (Eastern Concord variety).



Fruits that will usually require additional pectin are sweet cherries, quince, ripe blackberries, sour cherries, grapefruit, grape juice, grapes, melons, and oranges. Fruits always requiring added pectin are peaches, pears, figs, apricots, elderberries, strawberries, raspberries, grapes (Western Concord variety), guava, and pomegranates.

In practice, pectin is almost always added in order to obtain a consistent product.

Farm-scale processing basics

Fruit spreads are made from a variety of fruits, singly or mixed, with varying levels of ripeness. Pears, peaches, apricots, strawberries, and raspberries gel best if picked slightly underripe. Plums and cherries are best if picked when just ripe. Harvested fruit is inspected for quality, using color, ripeness, and taste as guides. Fruit that passes inspection is cleaned, crushed, and pasteurized.

Next, pre-measured amounts of fruit and/or juice, sugar, and pectin are blended in a cooking kettle and cooked until the desired thickness and taste are achieved. For fruit to gel, pectin, acid, sugar, and water are needed. "Low-" and "reduced-sugar" versions of jams and jellies require that the sugar content be at least 25% less than that in the regular product. The type of pectin may need to be changed to one that works with less sugar. Often gelatin is added. Fruit spreads are sweetened with fruit juices only and are cooked longer to reduce the fruit to a thick, jam-like consistency.

Pectin is usually blended with sugar and added to heated water or fruit juice. Pectins are classed as rapid-set and slow-set, or by the pounds of jelly that one pound of pure pectin will produce. Rapid-set pectin gels at higher temperatures than the slow-set type, and is usually used for jams and preserves to keep the fruit from rising to the top before it is set. Slow-set is used for jelly. The low-methoxy pectins differ from normal pectin in that they form gels at low sugar concentrations, or in the absence of sugar and over a wide range of acidity (or pH) values.

The mixture is usually reworked—cooked and cooled—about three times. If additional flavorings are to be included, they are added at this point. Citric acid or other acidifiers are added to obtain the correct balance needed to produce the spread. Lime and lemon juice are high in citric acid; therefore they are the most prevalent source used. Citric acid can also be obtained by the fermentation of sugars.

Preserves are almost always packaged in glass, although bulk packaging in food-contact-grade plastic is also done. In general, packaging materials that are approved for food contact are appropriate for use in organic processing. The packaging itself is likely to be one of the main costs involved in production.

Heat processing does not harm the product quality and gives a better seal as well as killing any mold that may be present on the top surface of the fruit mixture. (A minimum temperature of 185° F is needed to kill mold spores. This is easily achieved with a hot water bath since water boils at 212° F.)

Clean jars are filled with the fruit spread mixture and metal lids are placed on the jars. The jars are then heated in boiling water bath canners for 6-10 minutes before being cooled. Sealing the jars with paraffin wax is not recommended. If the seal is incomplete, mold can grow in the jelly.

Organic Production Issues

Fruit must be certified organic in order for the product to be certified as organic. Fruit from operations under the $5,000 exemption from certification cannot be used. See Jams, Jellies Resources for sources of information on growing organic fruits.

Organic Processing Issues

Product Composition

Only products containing 100% certified organic ingredients may be labeled "100% Organic." Products containing at least 95% certified organic ingredients with the other 5% of ingredients produced without the use of excluded methods (genetic engineering, sewage sludge, or ionizing radiation) may be labeled "Organic."

The National Organic Standard, §205.606, provides a list of non-organic agricultural products that may be used in "Organic" products if organic equivalents are not commercially available. If any of these non-organic ingredients are used, the search for organic sources must be documented.

Some sources of organic products listed on §205.606 can be found at www.606organic.com. Another good source of all types of organic ingredients is the Organic Trade Association's Organic Pages Online at www.theorganic-pages.com.

Products with at least 70% certified organic ingredients may be labeled "Made with Organic" and specify up to three ingredients or ingredient categories. The remaining 30% of ingredients may not be grown using sewage sludge as a fertilizer, may not include genetically-engineered (excluded) ingredients, and may not be irradiated. See "Labeling" for more information on how product composition affects labeling.

Pectin

High-methoxy pectin is a natural ingredient and should be organically sourced. However, it is also on the National List under

§205.606, indicating that nonorganic pectin may be used if no organic form is commercially available. Low-methoxy pectins, used in making reduced or sugar free products, are synthetic, but are on the National List under §205.605. Therefore, you can use them (low-methoxy pectins) in products labeled "Organic" or "Made with Organic" ingredients.

Citric acid

Citric acid is on §205.605 as a non-synthetic, nonagricultural ingredient. However, it must be produced by microbial fermentation of carbohydrate substances and not be derived from microorganisms that have been genetically modified.

Gelatin

Gelatin, if used, must be organic. If non-organic gelatin is used, it may only be used in "Made with Organic" products, and must be produced without genetically engineered inputs or processes.

Technical assistance in jam and jelly making is usually available through university food science departments and other programs to offer assistance to food product entrepreneurs. This expertise may be needed to adapt conventional recipes to organic, as organic ingredients often have slightly different chemical properties that may change the final product if not accounted for. For example, organic sugar usually contains a tiny bit more calcium than conventional sugar. This can change how pectin behaves.

Cleaning and sanitizing equipment

Cleaning involves use of detergents to remove visible dirt and most microorganisms, while sanitizing refers to elimination of the remaining microorganisms. Both processes

must be accomplished without contaminating the organic products with either cleansers or sanitizers. Sanitizers on the National List that can be used include the chlorine based sanitizers (bleach, sodium hypochlorite, and others), peracetic acid, hydrogen peroxide, phosphoric acid, and ozone. Peracetic acid is effective and more environmentally friendly than chlorine products, but it is more expensive. Ozone is most expensive but poses no risks to workers handling chemicals and leaves no residues to affect the environment.

Often, chemicals not on the National List, such as quaternary ammonium, iodine, and other synthetic surfactants, are allowed if followed by an "intervening event," such as passage of time or a clear water rinse, that ensure the organic products do not contact prohibited materials. The processor will be expected to demonstrate that the intervening event is sufficient to preclude contamination, and regularly monitor for residues. Monitoring may include pH testing, or ammonium test strips if using quaternary ammonia products. Testing must demonstrate that no residues remain. However, the best approach is always to use cleaners and sanitizers that are on the National List. Be certain to consult the certifier. OMRI (Organic Materials Review Institute) guidance materials are definitely recommended for help in determining which cleaners and sanitizers to use.

Labeling

Labels need to include the common name of the product (for example, "Raspberry Jam") and list all ingredients in descending order of predominance. The processor and the date of packaging/batch code needs to be identified so that in case of product recall, only affected batches can be recalled instead of the whole product line.

National Organic Program (NOP) labeling requirements. If labeling as "100% Organic" or "Organic," the organic ingredients must be identified in the ingredient statement and the statement "Certified by [Certifying Agent]" must appear on the label under the name of the processor. These products may display the USDA Organic seal. (See Part I, Organic Labeling for definitions.)

For products labeled "Made with Organic Ingredients," organic ingredients must be identified in the ingredient statement and the total organic percentage can be displayed on the principal display panel. The statement "Certified by [Certifying Agent]" must appear on the label under the name of the processor. Products with less than 70% organic ingredients can only identify the organic content in the ingredient statement, and total organic percentage can be displayed on the information panel only. These products may not display the USDA seal.

Regulatory

Farm-scale processing. In general, the processor will need to be licensed or permitted as a food handler. Usually this requires successfully completing courses in safe food handling as required by the state health department. The state health department will be able to direct interested parties to approved courses.

Where will processing take place? In some states, home-based kitchens may process some types of food for sale. For example, in Tennessee, a "Domestic Kitchen" is a home based kitchen that meets the established requirements herein in order to process non-potentially hazardous foods for sale to the general public.

"Non-potentially hazardous foods" are jam, jellies, candy and baked goods that do not meet the definition of potentially hazardous foods. [5] Most states require that commercial food processing be done in a state-licensed commercial kitchen such as those used by restaurants, bakeries, churches and other places of worship, community centers, fairgrounds, etc. Generally, any location that prepares food for service to the public may be an option.

Processors will probably want to carry some food product liability insurance, and in fact many farmers' markets and most retailers require proof of such insurance. Insurance companies may be able to work with food product liability insurers or direct processors to sources of such insurance. Many small producers have obtained food product liability insurance at very affordable rates through their local Farmers Union or Farm Bureau.

Jams, Jellies, and Spreads Resources

General information on organic fruit production

ATTRA publications. Available free of charge. Call 800.346.9140, or visit www.attra.ncat.org/horticultural.html#Fruits Fruit publications include:

- Tree Fruits: Organic Production Overview
- Grapes: Organic Production Organic and Low-Spray Peach Production
- Organic Pear Production
- Low-Spray and Organic Plum Production
- Strawberries: Organic Production
- Blueberries: Organic Production
- Organic Culture of Bramble Fruits

Also see NCAT's *Organic Crops Workbook: A Guide to Sustainable and Allowed Practices* at attra.ncat.org/new_pubs/attra-pub/PDF/cropsworkbook.pdf

General information on fruit processing

Smith, Durward. 2006. Fruit Jellies–Food Processing for Entrepreneurs Series. University of Nebraska Cooperative Extension Service Publication No. G1604. www.ianrpubs.unl.edu/epublic/pages/publicationD.jsp?publicationId=418

An in-depth technical discussion of jelly and jam making

Oregon State University Jam and Jelly websites: oregonstate.edu/dept/foodsci/foodweb/jelly.htm

Links to publications from Cooperative Extension

National Center for Home Food Processing: www.uga.edu/nchfp/how/can7_jam_jelly.html

Information on many different types of spreads with a large number of recipes

Selected Jams, Jellies, and Spreads Resources from Organic Processing magazine:

Organic Processing magazine is published quarterly by The Target Group, Inc. To subscribe, visit: www.organicprocessing.com

Crofter's Gets Conventional Processors Out of a Jam—and Into the Niche www.organicprocessing.com/opspring05/opspring05enterprise.htm

Seeing Eye to Eye: A Guide to Finding the Perfect Co-packer www.organicprocessing.com/opfall05/opfall05coverstory.htm

Organic Pest Management Operations and Requirements www.organicprocessing.com/opfall04/opod04manufacturing.htm

Segregating an Organic Facility: It's Not as Hard as You Think www.organicprocessing.com/opfall05/opfall05processing.htm

How to Clean an Organic Facility
www.organicprocessing.com/opfall03/opod03manufacturing.htm

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info@omri.org
www.omri.org

ATTRA publications. Available free of charge. Call 800.346.9140, or visit Organic Certification and Regulations:
www.attra.ncat.org/organic.html#overview
Publications include:

- National Organic Program Compliance Checklist for Handlers
- Organic Certification Process
- Preparing for an Organic Inspection: Steps and Checklists
- Organic Materials Compliance

SECTION II, **ENTERPRISE 4**

Table Eggs

by Anne Fanatico and George Kuepper

Table Eggs: The Basics

What are table eggs?

Table eggs or shell eggs are eggs in the form most familiar to consumers—fresh and in-the-shell. Though commercial table eggs may come from a variety of birds, and many of the procedures are the same, this discussion will focus on chickens. It also focuses on relatively small operations, particularly those with direct-to-consumer sales or sales to local restaurants and retailers.

Farm production basics

Acquiring chicks. Farmers typically purchase day-old chicks from hatcheries or distributors that work with hatcheries. Shipping is usually done via USPS or UPS. Sometimes chicks may also be purchased from local farmers co-ops and farm suppliers. It is wise to order only pullets (female birds less than one year old), unless the producer also wants to raise males for slaughter. Depending on the cost of feed, it may be more economical to buy started pullets, which are birds old enough to lay eggs (about 20-22 weeks).

Brooding. It takes up to eight weeks for chicks to "feather out" and they are especially delicate and vulnerable for the first three. Chicks must be raised in brooder boxes equipped with lamps for heating and which provide protection from drafts, predators, and excessive handling. Non-slippery bedding is required to prevent "spraddle legs." Growers recommend rice hulls, wood shavings, ground corn cobs, and similar media. Close confinement is desirable for warmth, though at two weeks or so, the need for space will increase as the birds begin to grow rapidly.

Appropriate food, clean water, and grit must be available from the outset. Pullet feed should contain 18% protein for the first eight weeks, and be reduced to 16% from then up until laying.

Layer housing. Even free-range poultry requires some form of housing to provide nesting sites for laying and roosting, to provide protection from the elements and predators, and to ensure the comfort necessary for productive laying.

A minimum of one-and-a-half to three square feet of floor, per hen, is recommended. There should be one nest box for every four to five hens, located two feet above the floor litter. Allow six to eight inches per bird for roosting space, with the poles spaced 12–14 inches apart and 18-36 inches above the floor litter. [6,7]

Layer management and nutrition. Once laying begins, pullets should be switched to a laying ration that contains 16 - 18% protein with 3.5% calcium. Floor litter should be three to six inches deep, low dust, and kept reasonably dry. Wet litter should always be removed.

Day length can be managed to stimulate laying. At 18 weeks, pullets should be placed on 14 hours of daylight. When half of the birds have begun laying, it should be adjusted to 16 hours. [8]

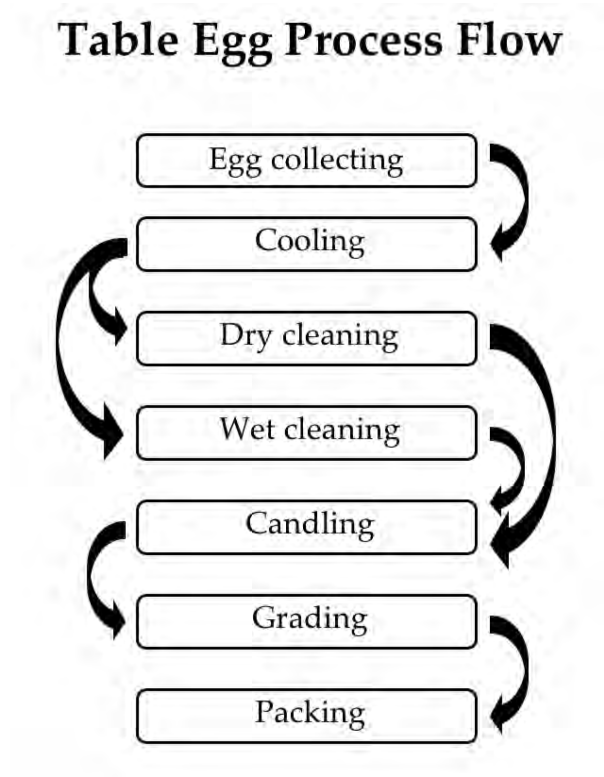
The laying cycle for a chicken flock is usually 12 months. Production peaks at around six to eight weeks, then slowly declines. In commercial production, hens are either destroyed or processed at 70 weeks, or they are forced to molt. Molting is a natural process in which birds renew their feathers and replenish their bones and reproductive systems. During molting, egg laying declines further or ceases entirely. Following forced molting, the hens can resume production and are often kept up to 105 weeks of age.

Egg collection. Eggs should be collected twice a day, more often if weather is extremely hot or cold. Immediately discard any cracked or misshapen ones. Promptly cool eggs to 45° F. (Eggs held at room temperature rapidly lose grade.) Store them with the small end down. [9]

On-farm processing basics

Ideally, eggs are processed the day after they are laid. The USDA requires processing within 30 days of lay. In programs that assure high quality, eggs are processed within seven days of lay.

Cleaning. Discard eggs that are very dirty. If eggs are washed (wet cleaned), the



wash water should be about 20° F warmer than the eggs. This encourages the contents to swell and push dirt out of the pores. Water of equivalent or lower temperatures can draw contaminants into the eggs; much higher temperatures can lead to cracking. Water exposure should be as brief as possible to reduce the possibility of contamination. Mild cleaning agents are sometimes used in wet cleaning. Eggs should be dried as soon as possible.

It is unusual, but wet cleaning is prohibited by state regulation for some markets. Specifically, Minnesota regulations prohibit the sale of wet-cleaned eggs to stores and restaurants. [10] Immersion washing is especially frowned upon and may be specifically prohibited. Dry cleaning using a brush, sandpaper, or a loofah sponge has fewer issues than wet cleaning, and is recommended for small producers.

Preventing dirty eggs through better management of the hens and their nesting space will greatly reduce the need for cleaning the eggs. (See Plamondon's "Egg Quality/Egg Washing" webpage in Table Egg Resources.)

Candling. Candling is a means for assessing the interior quality of eggs. The name hearkens back to the days when an egg was held up in front of a candle to reveal the inside. Today, a high-intensity light is used. Interior quality is determined by the size of the air cell (the empty space between the white and shell at the large end of the egg, smaller in high-quality eggs), the proportion and density of the white, and whether or not the yolk is firm and free of defects. [11] Candling will also reveal cracking; cracked eggs should not be sold. Farm-scale equipment for candling can be homemade or is available through farm supply outlets such as NASCO (see Table Egg Resources).

Grading. The primary USDA egg grades are AA, A, and B. Grades are based on both exterior and interior quality. For specifics on egg grading, see the USDA-AMS Poultry Programs website (www.ams.usda.gov/poultry/). Grading also involves sorting eggs into weight classes or sizes (peewee, small, medium, large, extra large, and jumbo). The USDA *Egg Grading Manual* details what an egg of a specific class needs to weigh. Many producers do not grade but mark their eggs as mixed, unclassified, or ungraded. Farm-scale equipment for grading is available through farm supply outlets such as NASCO (see Table Egg Resources).

Packaging. Eggs may be carton-packed according to size or as unsized. Standard packaging for direct sale is by the dozen, half-dozen, or dozen-and-a-half. Cartons are typically made of pulp paper, styrofoam, or clear plastic.

Labeling. Eggs packed under federal regulations require the pack date to be displayed on the carton. It is a three-digit Julian date that represents the consecutive day of the year. The carton is also dated with the "Sell-by" or expiration date, which depends on the state requirements. Eggs with a federal grade must be sold within 30 days from day of pack. [12]

Organic Issues

Organic production issues

Obtaining chicks. For any poultry to be considered organic, it must be managed as such beginning no later than the second day of life. Therefore, the standard practice of buying day-old chicks from conventional hatcheries presents no problem. However, organic growers do not have the option of using starter pullets, unless they came from a certified organic grower.

Whether the organic farmer seeks a niche market for colored eggs, or chooses to produce standard white eggs, the issue of breed selection is important. The National Organic Standard stipulates that breeds should be chosen for disease resistance and suitability to site and operation. However, high-yielding genetics are typically used in both conventional and organic poultry production, with consequences. High-yielding birds can lay over 300 eggs per year but may also develop osteoporosis or brittle bones.

There is increasing interest in using heritage breeds for organic production. Fortunately, selection for egg production has been common with heritage breeds in recent decades, and good utility strains exist. For further information, read ATTRA's *Poultry Genetics for Pastured Production* (see Table Egg Resources).

As technology advances, genetically-engineered and cloned birds may become available. These are prohibited in organic production.

Brooding. The National Organic Standard §205.239(a)(1) requires outdoor access for all organic livestock. This does not apply to brooding chicks. Confinement brooding is a proper and good example of *temporary confinement* as allowed under §205.239(b).

While many conventional growers provide chicks with a medicated starter ration while brooding, this is not allowed in organic systems. Organic management requires 100% organic feed. Chick starter feeds, as well as all feeds provided at later stages of life, must be certified organic.

Layer housing. Housing should protect birds from the elements, maintain a comfortable temperature, provide ventilation and clean bedding, and allow birds to exercise and conduct natural behaviors. Cages are not permitted.

In addition, the birds must have access to the outdoors for exercise areas, fresh air, and sunlight, and must be able to scratch and dustbathe. According to §205.239(b) of the National Organic Standard, livestock may be temporarily confined due to inclement weather, requirements of the stage of production (e.g. brooding), conditions under which the health, safety, or well-being of the animal could be jeopardized, or risk to soil or water quality. Many certifiers allow confinement during cold weather. However, some breeds are quite hardy and will venture outdoors if allowed.

Wire and all-slat flooring is generally not permitted; some solid flooring with litter should be maintained so birds can scratch. If birds are likely to eat their litter, it must be organic to comply with the requirement for 100% organic feed.

Litter treatments, such as sodium bisulfate and hydrated lime, are common in conventional production to lower pH, reduce microbial growth, and control ammonia production. These are synthetic materials that are not allowed in organic production. If litter treatments are used, they must be either non-synthetic or be made from synthetics allowed for that purpose on the National List. (Hydrated lime is on the National List, but is restricted to use as a topical treatment for external pests.)

Where used, treated lumber must not contact the birds, eggs, feed, or soil they traverse. For guidance on alternatives, read ATTRA's *Organic Alternatives to Treated Lumber* (see Table Egg Resources).

In practice, the requirement for outdoor access has resulted in a wide array of housing options and a fair bit of confusion over how much space and time outdoors that birds should have. At least one certifier has approved a system wherein outdoor access is limited to enclosed porches. At the other extreme are some pasture based systems where birds not only go outside, but have abundant forage.

The National Organic Standard does not specify indoor or outdoor stocking densities,

but many organic certifiers look for a lower stocking rate than the industry average of 0.7 square feet per bird; most look for at least 1.5 square feet per bird.

There is no limit on the number of birds that may be raised in one house; nor is there a requirement for the number of bird exits or "popholes" that should be provided. Furthermore, how much outdoor access a bird should have during its lifetime is not specified under the Standard.

Layer management and nutrition. Feed must be 100% organic, whether produced on-farm or purchased. It may contain only those synthetic additives and supplements found on the National List. No animal drugs, antibiotics, or slaughter byproducts are allowed in organic feed. Feed rations must provide the levels of nutrients appropriate to the type of bird, breed, and age/stage of development. Any pasture or free-range areas must have been free of synthetic chemicals for three years.

Synthetic amino acids are prohibited in organic production, with the exception of synthetic methionine, which will be allowed until October 1, 2010. Providing adequate methionine in poultry diets can be challenging when birds do not supplement their diet with free-range foods like insects and earthworms. Supplementing with methionine-rich soybean or sunflower meals result in diets excessive in overall protein. This stresses the birds and leads to more nitrogen excretion in manure and urine.

Generally, certifiers do not permit forced molting because it is very stressful to the birds. Organic producers, especially small producers, may let the flock molt naturally, though it is common to destroy/process the flock at about 70 weeks. Natural molting is not as efficient as forced molting, but it maintains the birds' welfare and extends their productive life. Ideally, layers should be allowed to molt naturally and kept for at least two to three years.

Disease and pest management. Disease prevention in organic systems starts with clean birds. Make certain to get birds from breeding flocks approved by the USDA National Poultry Improvement Program, which certifies that flocks are free of certain diseases.

Proactive health management is very important in organic production. This includes proper nutrition, and adequate housing, space, and ventilation to reduce stress and support immunity. Good sanitation is vital. Sanitation between flocks is particularly important. An "all-in, all-out" management (completely harvesting a flock before starting a new one) is advised. This reduces pathogens, many of which die during the "downtime." Downtime should last two to four weeks for good control.

Thorough cleaning is an important first

step towards effective sanitation and disinfection of a poultry house. Organic matter must be removed in order for a disinfectant to work. Approved sanitizers and disinfectants include chlorine materials, iodine, hydrogen peroxide, peracetic acid, phosphoric acid, organic acids, and alcohol, though alcohol is not particularly effective. Propane-fueled heat tools may also be used for disinfection.

In addition, water lines need regular care. They can be flushed with organic acids, such as citric acid or vinegar, to loosen debris, and then sanitized with iodine or hydrogen peroxide, between flocks. Chlorine is also used for water-line sanitation when birds are in the house.

Vaccines are allowed in organic production. Poultry vaccines are commonly used to prevent Marek's disease, Newcastle disease, infectious bronchitis, and coccidiosis.

Good biosecurity should be practiced, including limiting visitor access to the bird area. Footbaths with approved disinfectants, such as iodine, as well as disposable booties or dedicated footwear, can be used at the entrance to houses. Since wild birds, particularly waterfowl, can carry diseases that harm domestic poultry, it is important to exclude them from free-range areas. Outdoor feeders should not attract wild birds. Self-feeders that dispense feed on demand are advisable (see Table Egg Resources).

Some producers have biosecurity concerns with outdoor access and argue that vaccines need time to create immunity; however, long periods are not required. Immunity generally develops a week or so after the first boost. The last round of vaccines (usually 16-18 weeks) is intended to protect the flock during lay and outdoor access is not likely to interfere. For further information, see Table Egg Resources.

Probiotics are often used in organic poultry production to replace prohibited antibiotic growth promoters (AGP). Probiotics are beneficial microbes, which are fed to birds to establish beneficial gut microflora, thereby reducing colonization by pathogenic organisms, such as *Salmonella* and *E. coli*, by "competitive exclusion."

Other natural products include prebiotics, which are non-digestible food ingredients that benefit the host by selectively stimulating the growth of bacterial species present in the gut. An example is lactose, which is used by beneficial lactic acid bacteria in the gut.

External parasites such as mites can be managed by allowing birds to dustbathe. Many producers add diatomaceous earth to the dustbaths to increase their effectiveness. If mite treatment is needed, pyrethrum is an allowed natural product. For roost mites, which inhabit roosts, cracks, and crevices in the house, a natural oil, such as linseed oil, can be used.

Rotating yards, range, and pasture is the key to reducing internal parasites. The National Organic Standard prohibits standard synthetic parasiticides, though nonsynthetic materials and additions to the National List might be made. Conventional anticoccidial medications are not allowed for control of the protozoan parasite coccidiosis, which is usually controlled through management or vaccines. Read ATTRA's *Poultry Parasite Management for Natural and Organic Production: Coccidiosis* (see Table Egg Resources).

For rodent, fly, and other pest control, a multilevel approach is used, beginning with prevention and sanitation. Secondly, mechanical and physical controls such as traps and fans are used. Thirdly, natural and/or allowed synthetic pesticides can be used.

Physical alterations. Physical alterations are allowed only if essential for animal welfare and done in a manner that minimizes pain. Beak trimming (to reduce feather pecking) is controversial. Feather pecking is an indicator of stress in the perpetrator and the victim and might better be addressed through management or lower bird populations. Beak trimming is only permitted if such methods fail.

Manure management. The National Organic Standard requires managing waste in ways that do not pollute or contaminate organic products, and that optimize nutrient recycling. Burning may not be used as a means of disposal. Ideally, organic poultry manure will be returned to organic cropland and pasture. Read ATTRA's Manures for Organic Crop Production (see Table Egg Resources).

Organic processing issues

Wet cleaning. If detergents or other additives are used for wet cleaning, they must either be nonsynthetic or among the allowed synthetics on the National List at §205.603 of the National Organic Standard. Allowed synthetics include chlorine, hydrogen peroxide, ozone, and peracetic acid. These serve mostly as sanitizers rather than as washing agents. At the time of this writing, the Organic Materials Review Institute (OMRI) lists one brand name product as an allowed egg wash (see OMRI in Table Egg Resources).

Be conscious of where wash water goes. Ongoing and excessive use of detergent can be harmful to septic systems. Vinegar is nonsynthetic and effective at removing bacteria and stains if mixed 1:3 with water. Vinegar contains acetic acid, which helps to kill microbes.

Labeling

The federal Food and Drug Administration (FDA) sets the basic requirements for food product labeling. There are often state-based programs available through departments of agriculture that can assist in complying with federal requirements for weights and measures and other areas of compliance. State departments of agriculture may also have additional labeling programs that can help distinguish products. The Oklahoma Department of Agriculture, Food, and Forestry, for example, has a program titled *Made In Oklahoma* that allows in-state farms and other businesses to promote and label their products accordingly.

National Organic Program (NOP) labeling requirements. When dealing with whole table eggs, there are two levels of organic labeling:

1. A product may be labeled as "100% Organic" if it contains only 100% organic agricultural ingredients. Table eggs can certainly be labeled "100% Organic" if they were not washed, or were washed using water without any cleaners or sanitizers. The USDA's organic seal may be used on products labeled "100% Organic."

2. A product may be labeled "Organic" if it contains a minimum of 95% organic agricultural ingredients. Certifiers may require that whole eggs washed or sanitized using any agent other than pure water be labeled "Organic." The USDA's organic seal may also be used on products labeled "Organic."

Additional specific requirements for organic labeling are addressed in Subpart D of the National Organic Standard §§205.300–311.

Additional regulatory issues

The Egg Products Inspection Act was passed in 1970 to ensure egg products are safe for human consumption. In 1972, quarterly on-site inspections of all shell egg processors became required. A producer with a flock of less than 3,000 hens is exempt from complying with the Act, although states have their own egg laws and regulation is on a state-by-state basis.

All food products manufactured for the public must be prepared in an approved licensed facility. In most states, licensing is overseen by the state health department. Additional approval and licensing by the state department of agriculture might also be required for some enterprises in some states.

If the farm falls within the limits of a city, there may be additional zoning requirements to meet. City and/or county regulations may also apply to the construction of new facilities if those are needed.

Table Egg Resources

General information

ATTRA publications. Available free-of-charge. Call: 800-.346-.9140, or visit www.attra.ncat.org/livestock.html#Poultry

Poultry publications include:

- Alternative Poultry Production Systems and Outdoor Access
- Growing Your Range Poultry Business: An Entrepreneur's Toolbox
- Label Rouge: Pasture-Based Poultry Production in France
- Pastured Poultry: An HPI Case Study Booklet
- Poultry House Management for Alternative Production
- Poultry: Equipment for Alternative Production
- Poultry Genetics for Pastured Production
- Range Poultry Housing

Sustainable Poultry
www.sustainablepoultry.ncat.org

Standards, grading, and equipment

USDA-AMS Poultry Programs
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Fax: 202-690-2930
www.ams.usda.gov/poultry

NASCO
901 Janesville Ave.
P.O. Box 901
Fort Atkinson, WI 53538-0901
Tel: 800.558.9595
www.enasco.com/top/313/

Egg washing

Egg Quality/Egg Washing. No date. Robert Plamondon's Poultry Pages.
www.plamondon.com/faq_eggwashing.html

Biosecurity

USDA Biosecurity for the Birds
www.aphis.usda.gov/vs/birdbiosecurity/

Fanatico, Anne. 2006. Avian Influenza in Free-range and Organic Flocks. ATTRA. September. attra.ncat.org/avian.html

Organic

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