



Building an On-farm Poultry Processing Facility

A guide to planning and constructing a
Mobile Poultry Processing Unit (MPPU)
or stationary poultry processing facility
on your farm



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{ Introduction }

A lot has been said about the mobile poultry processing units, or MPPUs, in Massachusetts. They've been called the Chicken Chop Shops or Slaughterhouses on Wheels. An NPR reporter likened one of them to “a small mobile home”—at least on the outside—while an *Edible Boston* article described the other MPPU as “a jumble of stainless steel contraptions mounted atop a flatbed trailer.” And why do these things exist in the first place? To help farmers, as the *Springfield Republican* succinctly put it, “turn their backyard into a government-approved slaughtering facility.”

Welcome to the glamorous world of on-farm, do-it-yourself poultry processing!

A few of us in Massachusetts—at New Entry Sustainable Farming Project (New Entry), New England Small Farm Institute (NESFI), Island Grown Initiative (IGI) on Martha's Vineyard, and regulators in three different state agencies—have been closely involved in helping Massachusetts poultry growers find legal, affordable options for processing meat birds. When this work began over a decade ago, anyone raising meat birds for sale in Massachusetts had to either drive a very long distance to the nearest USDA-inspected slaughterhouse in another state, sell the bird live, or—most commonly—process and sell on the sly. There is still no USDA or state-inspected poultry slaughter facility in Massachusetts aside from three state-approved MPPUs: one on Martha's Vineyard, operated by IGI, and two on the mainland, operated by NESFI



and New Entry. A new USDA facility opened in southern Vermont, but for many producers it remains too far away or too expensive, at roughly (as of this writing) \$5 per chicken before transportation.

The following paragraphs will explain in more detail where on-farm poultry processing fits in, but this is all a precursor to the real purpose of this guide: to help anyone—farmer, organization, or entrepreneur—to plan and build a mobile poultry processing unit or stationary on-farm poultry processing facility. There are many, many things to consider when you are building a processing facility, and small-scale and mobile facilities have special challenges. Having twice been through this process, we have learned quite a bit about the snags that can turn up along the way and the consequences of leaving one consideration out of the equation, and this is our attempt to help you learn from what went right for us ... and, more importantly, from what didn't.

Before going any further, a few notes on terminology. Firstly, you'll see "MPPU" used a lot in this guide, since it's a whole lot shorter than "mobile poultry processing unit." In other places, you will often find the more general "MPU," for "mobile processing unit," which can apply to a facility used for processing poultry, red meat, or something else entirely (for example, the Kentucky MPU is often used by aquaculture producers). We use MPPU partly because it's the acronym we have been using for years, but also because poultry and red meat slaughter and processing are substantially different from each other, particularly when it comes to on-farm processing.¹

¹ This guide will also use the term "processing" to cover essentially the whole process that begins with a live bird and ends with a cleaned, eviscerated whole carcass ready to be packaged and sold. For red meat, there are mobile units that specifically deal with on-farm slaughter but not all of the processing, which

Some of these differences represent opportunities for on-farm poultry processing, and help explain why on-farm processing is farther along for poultry than for red meat. Many of the differences are logistical. For example, a chicken or turkey carcass can be sold whole (in fact, regulation often requires it) and can be considered a final product without being broken down into cuts. That bird can be sold the same day it was processed and does not need to be aged, saving a great deal on cooler space compared to red meat. The actual steps of processing poultry are also simple enough that new helpers can be put to work with only a few minutes of training.

Perhaps the largest advantage poultry has over red meat for on-farm processing is its special regulatory status. USDA requires that any red meat entering into commerce must be processed at a USDA inspected facility. On-farm facilities, including mobile units, can be USDA inspected, but it adds new challenges and new costs. A facility processing over 20,000 birds per year requires USDA inspection, but there are several federal exemptions that provide conditions under which small-scale poultry processing can proceed without continuous USDA inspection. Farmers using MPPUs or their own on-farm facilities commonly process under the Producer/Grower 1,000 or 20,000 bird exemptions. In order to qualify, the producer needs to also be involved in the processing; that is, you can't just drop the birds off to be processed by someone else (which would be considered "Custom Exempt" slaughter - perfectly legal, except that you can't sell the birds afterward). See **Appendix C** for a list of the USDA exemptions.

While on-farm processing can take place on either a mobile or stationary facility, for the time being this guide focuses more on MPPUs as examples. An updated version is planned which will include more examples and information that focus on stationary on-farm facilities. In the meantime, though, you will find that even when referring to mobile facilities, most of the guidance in the following pages applies to stationary facilities as well.

Who builds stationary on-farm poultry processing facilities?

You'll notice that this section is short, but it's not just because of this guide's focus on mobile units; it's also because stationary on-farm facilities are generally built by producers who plan to use the facility to process their own birds. This is largely because you can only select a single USDA exemption each year, so you generally have to choose between processing your own birds or processing other peoples'. Also, USDA's language in the Producer/Grower 20,000 bird exemption that specifies the birds must be processed by the grower on "his or her premises." Exceptions to this qualification can be possible for a mobile unit parked at a docking station, but generally on-farm stationary facilities make the most sense if you are processing your own birds. Compared to renting or pitching in on the construction of a mobile unit, building your own on-farm facility has the disadvantage of increased upfront expense and hassle, but the advantage that you are not at the mercy of a shared schedule and you will probably be more able to process smaller batches throughout the season, whereas when you are renting a mobile unit (or transporting the birds a significant distance to an inspected facility), it may only be economical to do fewer, larger-sized batches. Because of the upfront cost and labor, there may be a certain scale of production above which it will be more economical to build your own facility. If you are just getting started with a smaller number of birds, you will probably want to see how things go for a season or two before launching into this kind of investment.

includes carcass breakdown; for poultry, it all happens on the same day, and can be managed quickly enough that there is no need to have entirely separate facilities for "slaughter" and "processing."



Who builds MPPUs?

Producers

Examples: Pat's Pastured (R.I.); Island Grown Co-op (Wash.); Tea Hills Farm (Ohio); Wagbo Peace Center (Mich.)

When local poultry processing options are lacking, many individual poultry producers take matters into their own hands by processing their own birds on the farm. For producers who wish to market their poultry products, the most common form of on-farm processing is a permanent or semi-permanent facility. These facilities range from a few pieces of equipment in a shed to a dedicated sanitary processing building.

Determining which kind of facility is the best fit begins with considering a number of factors, including the volume of birds to be processed, availability of other processing options, and the state's regulatory environment. If birds processed on-farm are for sale (rather than home consumption), some states will require the facilities first be inspected and approved. Regulatory requirements, particularly regarding waste disposal, may be expensive; it is crucial to determine the state and local government requirements early in the planning process. Another consideration is the upfront cost of construction and equipment. Will the investment pay itself off, or is there a more cost-effective option? In many cases – such as, most famously, Joel Salatin's facility at Polyface Farm – a permanent or semi-permanent on-farm processing facility is the farmer's preferred option, especially with larger volumes of birds (1,000 to 20,000) or when other options simply aren't available.

However, while a dedicated on-farm facility will often make the most sense for producers as they scale up their production, the financial and regulatory burden of building and licensing these operations can make the project prohibitive for smaller poultry growers. In order to avoid the time and money investment required to build a bricks-and-mortar facility, a group of producers can pool their resources to build and share a mobile poultry processing unit (MPPU). An MPPU is, in short, a traveling slaughterhouse: a trailer fitted with poultry processing equipment which can travel between farms, operated either by the farmer, by a crew that travels with the unit, or both. We envision producer co-ops as ideal owners and operators of MPPUs, as the producers are able to share costs and management and eliminate reliance on outside sources for processing. As they scale up production, producers may wish to graduate to a bricks and mortar facility—whether this means individual farmers building their own on-farm facilities or a producer cooperative collectively building a centralized slaughterhouse.

MPPUs can also be useful even when they are not being shared between farms. For example, Tea Hills Farm near Loudonville, Ohio, raises pastured poultry on several different properties and owns an MPPU which

travels between their farms, and Patrick McNiff built an MPPU to process chickens and turkeys at his Rhode Island farms.

Organizations

Examples: NESFI/NESFP MPPUs (Mass.); Heifer International MPU (Kentucky); Vermont MPPU; Island Grown Initiative MPPU, (Martha's Vineyard, Mass.); Stone Barns Center, (Pontico Hills, NY)

Most of the MPPUs currently being used by small-scale commercial poultry producers were built, funded, and are often operated by non-profit organizations, government agencies, academic institutions, or some combination of these

groups. The unit may be rented to farmers, who are trained to operate the unit (NESFI/NESFP, Kentucky); in some cases a processing crew may travel with the unit (Martha's Vineyard); or, the case of the MPPU built by the Vermont Department of Agriculture, the unit is leased by an individual who operates it as a business.



Mobile unit managed by Island Grown Initiative on Martha's Vineyard, Mass. Built by Cornerstone Farm Ventures.

These projects serve an important purpose, not only by providing some farmers with local poultry processing options, but also by kick-starting the development of more regional poultry processing and marketing alternatives and spurring more demand for locally produced and processed poultry. MPPUs built by organizations are generally funded by grants and private donations, and are intended to benefit farmers rather than return profits to the unit's owner. However, unless additional grants or donations are available, organizations must return enough money to cover the unit's operating, repair, and management expenses, as well as insurance and storage costs.

Organizations might also wish to build on-farm processing facilities. If the organization raises birds of its own, it can approach the process much as an individual farmer would (see above), although financial considerations and project goals may be quite different. If the plan is to provide a service to others who are growing poultry, check the USDA exemptions (Appendix I) to see which would apply in this situation, and check with state and local regulators to determine what rules would need to be followed in order for producers to bring their birds to a USDA-exempt offsite plant and still be able to sell them afterward.

Given the right budget, organizations may be in the position to build a higher quality, more efficient mobile or stationary facility than most producers would have managed. This kind of facility can serve as a model for the many farmers, consumers (and potential funders), and regulators who may have never seen an MPPU before and who may be interested in someday building processing facilities themselves or otherwise advancing local processing options. This is the goal of many organizations' projects: not to single-handedly provide processing

options for everyone who needs them, but to set the cause in motion, then pass the baton to producers and businesses. The question organizations may want to ask themselves, then, is: What model do we want others to replicate?

Businesses

Examples: Hudson Valley Poultry Processing, Inc. (NY); Spring Hill Poultry Processing (private contractor operating VT MPPU)

There is a market opportunity for businesses to help producers process their poultry, and MPPUs could figure into such a business in a few ways. An MPPU could be part of a traveling processing service, where the owner/manager travels with the unit and either handles all of the processing or at least provides labor in addition to the farmer's own labor; or an MPPU could be made available to farmers as a rental, similar to renting other types of farm equipment. New Entry and NESFI have explored both models, and one thing we've determined is that although it can be done, acquiring and operating an MPPU as a profitable business venture is a tall task. If you are considering this option, make sure to conduct a thorough business plan before investing in a facility. It is crucial to speak to your potential customers to get a sense of what they need and want; however strong the demand appears to be, you definitely can't assume that "if you build it, they will come."

Ed Leonardi, owner of Hudson Valley Poultry Processing, Inc., is one person giving it a shot. He put together an enclosed MPPU in upstate New York and drives it to individual farms, processing chickens as a service for a per-bird fee. Farmers provide many of the inputs (ice, propane, electricity). This model might need to be tweaked depending on state and local regulations; while New York has a law providing for state-inspected poultry processing, in Massachusetts and many other states, the farmer would need to participate in the processing in order to qualify under the USDA 1,000 or 20,000 bird exemption.

Stationary facilities offering custom processing have several advantages over MPPUs and on-farm processing for small farmers. The producer can save time by dropping off birds at a processor rather than doing it by hand, and the processor picks up the hassles of waste disposal, overseeing labor, facilities maintenance and upkeep, and meeting regulatory requirements. From the perspective of the business owner, however, bricks and mortar facilities require significant upfront costs in order to pass regulatory rules – especially if the facility will be processing over 20,000 birds per year, at which point it is no longer exempt from USDA inspection. The same hassles that the producer is happy to be rid of – waste disposal, labor, equipment upkeep – can add up quickly. For instance, whereas farmers renting an MPPU or processing on-farm are only responsible for their own waste disposal, a bricks and mortar processing business must dispose of the waste from all of its customers. Depending on state and local regulations, this may require costly infrastructure improvements.

Of course, the other regulatory issue is that a stationary facility that processes other peoples' birds as a service will likely be subject to state inspection—if that state offers it. If the state does not allow for state-inspected custom plants (and many don't, including Massachusetts), this type of processing would fall under USDA "Custom Exempt" status. This means that the facility's owner can process up to 20,000 chickens or 5,000 turkeys each year without requiring USDA licensure, but producers would not be allowed to sell their birds afterward. If you explore the USDA exemptions (**Appendix C**) and talk to state regulators, you may find that you would be allowed to buy the live birds, process them in your stationary facility, and then sell the finished product yourself.



Chapter 1

Getting Started

Now, before you run out and start buying processing equipment, let's slow down and think about what you're getting into.

Know your options. Firstly, if you are happy with the processing options already available to you, this guide may not be for you. Building and managing your own processing facility, mobile or on-farm, involves a good deal of time and/or money; it may only become a worthwhile effort when you find you are unhappy enough with your existing processing options that you feel compelled to take matters into your own hands. Unless you're just really, really into this kind of thing.

Know your needs. For most, this requires an exercise in business planning. What are your goals for this project? How many birds will you need to process for the venture to pay itself off? How much capacity will you need (how many birds processed per hour/per day)? Don't move forward with the project until you can at least estimate an answer to these questions.

Know your resources. How much can you afford to spend? How much time can you afford to devote? You may find that there is simply no feasible way for you to build a processing facility right now, but better to figure that out beforehand—and if you are having trouble figuring out where the money will come from to build an MPPU, don't forget that there may be others with an interest in pitching in to share the unit.

Aside from what you are able to contribute in money, time and expertise, you will also need to take into account how much you are willing to contribute. The answer will be especially important as you decide how much labor you want to pay for and how much you want to do yourself. This is not just a question of the labor involved in physically putting the facility together, but also the time involved to plan and organize the whole project. You can choose between two extremes – planning and building the entire facility from scratch, or paying to have it built – but it is ultimately a sliding scale. Following are some examples, focusing on MPPU and stationary facility case studies for illustration.

Option A: Buying an MPPU or on-farm facility

This option applies more directly to MPPUs. Theoretically, the simplest way to get your hands on an MPPU is to buy one that already exists. The drawback: right now, not many of them exist. However, this is an option worth keeping in mind, especially as institutional owners look to hand off MPPU ownership and management responsibilities to farmer co-ops and entrepreneurs. This handoff may be the intention of the project in the first place, and it presents a unique opportunity to the new owner: a unit that has already been built, tested, and possibly approved by regulators—and, for the local entrepreneur, an existing customer base.

MPPU ownership might also pass between organizations for logistical or financial reasons. For example, Heifer International 'sold' the MPPU it built in Kentucky to Kentucky State University for \$1 in order to avoid the hefty liability insurance Heifer would otherwise have to pay as the unit's owner, less of a concern for KSU because of its existing university policy.

Buying a completed bricks-and-mortar facility is an option less likely to be available. If you are thinking of buying a 'used' slaughterhouse, you will need to be very sure you are not inheriting any crucial logistical, regulatory, or sanitary problems. Some of these issues may be unexpectedly expensive to fix.

Option B: Leasing an MPPU

This option might make the most sense for an operator-entrepreneur or a farmer co-op looking for poultry processing options; however, it is also a rare opportunity. There is a precedent, though. In Vermont, George Eisenhardt ran Spring Hill Poultry Processing from 2009 to 2011 as leaseholder

of the MPPU built by the Vermont Agency of Agriculture and operated it as a traveling custom processing service. A lease-to-own arrangement allowed George to launch his processing business and begin developing a customer base with a minimal upfront investment; the MPPU operator-entrepreneur would take on even less risk in a year-to-year lease agreement without transfer of ownership. A similar prospect may be available for a future individual or group interested in leasing (or leasing-to-own) one of the Massachusetts MPPUs. As with buying a completed MPPU, when this type of opportunity arises, the owner will likely be institutional (such as a government agency, like the Vermont Department of Agriculture, or a nonprofit or educational organization, like Heifer International). The lessee could be another institution, an independent entrepreneur, or a cooperative of farmers.

There are some potential drawbacks to these arrangements for both the unit's owner and the operator who leases it, as illustrated by the Vermont MPPU. The unit was funded and its construction coordinated mainly by the State of Vermont, with the intention of getting it on the road through a lease-to-own arrangement, although a lessee was not secured until later. Spring Hill Poultry Processing agreed to lease-to-own the unit at a rate of over \$9,300 per year, so that the state could recoup the cost of constructing the new MPPU in 10 years. Because he was not involved in the construction of the unit, George inherited some design flaws, and there were some important things about the unit's construction that he would have done differently had he built it himself. More importantly, paying over \$9,000 per year in lease fees—on top of another \$3,500 per year in trailer, truck and product liability insurance—turned out to be a probable deal-breaker for George. At his initial rate of \$2.75 per bird, George would have had to process over 4,500 chickens just to cover those fixed annual costs. At the end of 2011, George decided not to continue the business. Had he owned the unit, he might have been able to recoup some of his sunk costs by selling it; on the other hand, the state is unlikely to find a buyer for close to \$75,000, the amount needed to finish recovering the MPPU's cost of construction.

Option C: Paying to have an MPPU or on-farm facility designed and built

This is another option for individuals or organizations with more money than time. Given the funds, this is likely the quickest way to get a high-quality facility, and is especially helpful for those with limited expertise of construction and fabrication or of poultry processing.

Some of the few experienced builders of MPPUs are Cornerstone Farm Ventures (Norwich, NY) and Brothers Body and Equipment (Galion, OH). Cornerstone has built several open-air MPPUs operating in New York State and the MPPU on Martha's Vineyard, and has consulted in equipment sourcing and floor plans for both mainland Massachusetts MPPUs. Brothers built the new enclosed unit for NESFI/NESFP in Massachusetts,



worked with Cornerstone to build the Vermont MPPU. [See appendix for contact information]

As of this writing, Cornerstone offers an enclosed 22 ft. 'Basic MPU' starting at \$45,900 and a 'Mini MPU' at \$10,000. The 25 ft. enclosed MPPU Brothers built for NESFI/NESFP was priced at \$56,000 before processing components (scalding, plucker, cones, eviscerating table etc.), which can add another \$12,000 to \$29,000. (The NESFI/NESFP unit cost over \$90,000 in all, with the addition of a diesel generator and other equipment.)

Finally, remember to check and double check that the new unit will fit state and local regulatory specifications, especially if it is being built in another state. As many (including ourselves) have learned the hard way, you will save yourself a good deal of money and time by getting it right the first time.

If you are paying someone to build a stationary facility, your options will obviously be geographically limited. Unless there happens to be someone near you with experience setting up a poultry processing facility, it will be all the more important for you to beef up on your knowledge of the processes and equipment, and to be able to give clear and precise directions to whomever is doing the actual construction.

Option D: Building it from scratch

Here's the option for those with plenty of time and limited money. Building the facility from scratch is the most complex option, but if done right, should be easily the cheapest—depending on how you value your labor. This construction guide aims to help make this option possible, but there is no cookie-cutter process for building an MPPU or on-farm facility. Each owner/operator has different needs and demands, from volume of birds processed to the state and local regulatory environment.

If you are building a unit from scratch, a solid and realistic plan is especially paramount. Educate yourself on the steps of poultry processing and different ways to set up a processing facility (this guide ought to be a start). Be sure, as always, that your plans adhere to health and environmental regulations. Perhaps most importantly, don't be afraid to ask for advice!

One of the challenges of building a facility from scratch is also one of the best reasons to do so: creative cost-cutting. Bargain hunting for each component can go a long way. For an MPPU, look for used trailers that could be easily customized to fit your plan. Building your own scalding and plucker may be much cheaper, though it may not always be practical for operations processing a higher number of birds. Similarly, volunteer labor can make an enormous difference, but be especially sure you choose someone knowledgeable to do your plumbing, electric and gas piping. There are many ways to cut costs, but you cannot afford to sacrifice safety or legality.

Option E: Everything in between

For most individuals and organizations interesting in owning and/or operating an MPPU or on-farm poultry processing facility, the smartest route will be somewhere in between paying someone else to build the whole thing and building it yourself from the ground up. For example, if you are buying the trailer for an enclosed MPPU, certain features may be worth paying for, such as windows, doors, and sanitary wall and ceiling surfaces. It may be worth paying more to fit the trailer for electric, plumbing, and gas – these inputs are both crucially important and, unless it is your particular area of expertise, a real pain to plan and install. And however convincing the online DIY guides, not everyone would be well advised to attempt building a scalding or plucker from scratch.

Lessons Learned: Supply and Demand

Who will use the facility?

If you are building a mobile unit with the intent of renting it out to producers (or offering on-farm processing as a service), it would be very, very wise to first get a list of *specific producers* who are legitimately interested in this service. Don't rely on anecdotal evidence or even reports from reputable sources saying that the demand is out there. In short, don't just assume that "if you build it they will come." This is something many of the local slaughter and other shared-use farm infrastructure projects across the country have done, to varying extents, and we've been guilty of it too. Knowing that there is a demand for local slaughter is a great first step, but what you really need to know is *who* those customers are and *what they are looking for*. We conducted surveys and spoke with plenty of interested producers before expanding the Massachusetts MPPU project with the enclosed unit. What we didn't fully understand was that most producers, despite voicing great interest in the project and the option of renting the MPPU, weren't actually ready to commit to the paperwork, state slaughter license fee (\$225), and logistical hurdles that have to be dealt with upfront before one can bring the unit to their farm. As a result, adoption has been a slower process than we imagined - an experience echoed by other projects around the country.

What's the "competition"?

This is another part of exploring your market and understanding your customer base ("customers" in this case being the farmers in need of processing options). How are most of these farmers processing their birds now? At the very least, you need to present a more attractive option than the ones that already exist. Since we're primarily talking about licensed facilities where one can process birds and *legally* sell them afterward, one likely competitor is the state or USDA-inspected facility where farmers currently haul their birds. The farther your potential customers have to drive to that facility, and the more they have to pay per-bird for processing, the more of an opportunity you have. In eastern Massachusetts, producers may have to drive five hours round trip just to drop their birds off at the nearest USDA-inspected facility, and pay \$5 per bird once they get there. The trip makes sense for some, but it's a window of opportunity for lower-cost, closer-to-home processing options.

However, your biggest "competition" may actually come from the other end of the regulatory spectrum. In many places, the status quo will be for farmers to simply operate below the radar, doing their own backyard processing or going to a custom processor who doesn't fall under state or USDA inspection. This is usually perfectly legal if the birds are for your own use, but not if you are selling them. If the birds are being sold directly to individual consumers, a farmer may be able to get away with it for as long as they like, although they will always run the risk of being found out and possibly shut down. If regulators have been cracking down in your area, this is an opportunity for you to present a much less risky processing option for farmers who have been operating "under the table." These producers also might start looking for legal processing options in order to start selling their birds to restaurants or at farmers markets, both of which will often require poultry to have been processed under state or USDA inspection.

One other note along these lines: Try to keep a bead on the local gossip related to your project. Obviously you can't trust gossip at face value, but if a new facility is in the works or an existing custom processor is going to begin operating under state or USDA inspection, you want to catch wind of it early and (after following up to make sure it's true, obviously) adjust accordingly. New facilities coming online may attract farmers that we otherwise would have served, but we don't see it as bad news - if it's good for small-scale poultry producers, we're onboard!



Chapter 2

What Type of Facility?

You've considered what you want, what you need, and what you can realistically pull off. You may want to go back and amend where you stand on all three of those points as you move forward with planning and building your facility, but for now let's plow ahead under the assumption that you are planning to be somehow involved in the construction of a mobile poultry processing unit or a stationary on-farm poultry processing facility. It's time to start sorting out just what this facility is going to look like. First, here are a few general concerns to think about as we look at different facility types:

Regulatory considerations. The more ambitious your plans, the more important regulatory concerns are likely to become—especially if the birds are being processed for sale. We can't stress this enough: *know your state and local regulations before you start construction.* See **Appendix C** for more regulatory resources.

Management considerations. Will the facility be changing hands? The more people that are going to get their grubby mitts on your baby, the more you need to think at each step: *How can I make sure somebody doesn't break this?*

Site considerations. Where on the farm will processing be happening? If the unit is mobile, what will it need to be close to (and far from) during processing? For example, where is solid waste and wastewater ending up, and how is it getting there?

Transportation considerations. If it's an MPPU, always remember that the M stands for "Mobile" - don't lose sight of road-worthiness in your excitement over fancy equipment and efficient processing flows. How will it be moved from site to site? What kind of truck should be able to move it?

As we look at the physical components of MPPUs and on-farm processing facilities, keep in mind how the above considerations impact your own plans.

Mobile vs. Stationary

When you are planning an on-farm processing project, one of the most elementary decisions you will need to make is whether to build a stationary or mobile facility.

Your reasons for building the facility in the first place might make this decision easy. For example, if you are a nonprofit with the goal of creating shared-use infrastructure to support local farmers, or if you are a farmer interested in sharing the cost of constructing and maintaining the facility and equipment, a mobile unit would usually make more sense. If you are a farmer and you want to build a unit solely for the purpose of processing your own birds, a stationary facility may make the most sense.

If you're still on the fence, think about whether you already have a head start on one of the options. For example, if you have a building that could easily be converted to use for processing, you may want to go ahead with a stationary facility; if you have a trailer that could be converted into a mobile unit, that may be a cheaper and easier option, even if it never leaves the farm.

By building a mobile or semi-mobile unit and setting up one or more docking stations, you can also create a hybrid option that combines some of the strengths (and, perhaps, weaknesses) of both mobile and stationary facilities.

From the farmer's perspective, other advantages of building mobile units include:

- Can be shared with other farmers in order to offset costs of construction and upkeep.
- Can be re-sold as a complete unit, unlike a stationary facility (where you could only sell the equipment piece-by-piece).

- May be easier to dispose of wastewater, if state or local regulations require you to dispose of wastewater in compost or sewage system (whereas in a stationary facility the water might run directly into a floor drain—not necessarily permitted, e.g. in Massachusetts).
- Even if it is only being built for your own use, it can still be valuable for the facility to be moveable—especially if it is a large farm or not a single contiguous property, if you do not own the property, or if you anticipate moving within the lifespan of the facility.
- Flexibility to change business plans: You have the option of either keeping the unit for your own use or renting it out as a business.

Especially if you are only processing your own birds, advantages of a stationary on-farm facility include:

- Freedom to set your own processing dates (as opposed to renting an MPPU or booking off-farm processing; also applies to having your own MPPU).
- Potential for more workspace, bigger equipment, and thus more efficient processing.
- Not going on the road means no need to register and insure a trailer (although you'll still want to make sure it's insured somehow).
- Could be easier and cheaper to build, especially if you can use existing electric and plumbing connections rather than having to install wires, plumbing and hookups on a trailer.

Open-air vs. Enclosed

Another decision you'll need to make is whether you want the facility to be open-air or enclosed. This applies not only to MPPUs, but to stationary facilities, assuming that your regulators will allow you to process without walls. One of the better known open-air stationary poultry processing facilities is Joel Salatin's operation at Polyface Farm in Virginia. Also see the comparison of the enclosed and open-air Massachusetts MPPUs (at right).

There can be some middle ground between “open” and “enclosed,” especially for mobile units, where some steps of processing—such as slaughter or packing—may take place off of the unit. For an enclosed unit, it is a very good idea (and may be required by your state regulators, as it is in Massachusetts) to have a roof over at least the “clean side” of the operation, including the packing station. This could be something as simple as a tent or tarp, enough to keep anything from falling onto food products or contact surfaces (bird droppings, leaves etc.) and to shield workers from the elements. Processing in the rain is no fun, and neither is the sun's glare on a stainless steel table.

Enclosed facilities will usually be more expensive to build than open-air ones, as you might expect. However, there are a few advantages that a well-built enclosed unit should have over its open-air counterpart:

- Better suited for extended-season use (e.g. processing turkeys in late November) and poor weather.
- Reduced wear and tear on processing equipment.
- Better pest control (especially flies).
- Able to capture all wastewater onboard.
- Decreased nuisance liability (the neighbors can't see what's going on inside!).
- More road-worthy (for mobile unit—nothing is falling off on the highway).

Aside from affordability, open-air units have advantages of their own:

- Fewer surfaces to clean.

A Tale of Two Trailers

New England Small Farm Institute and New Entry Sustainable Farming Project worked together to bring two mobile poultry processing units to Massachusetts. The original open-air MPPU and the newer enclosed MPPU have some obvious differences, and each has its advantages and disadvantages, depending on the situation. For more details on these units, see **Appendices A and B**.

Open-air MPPU

Enclosed MPPU



~ \$35,000 **Cost of construction** ~ \$90,000

Can be pulled by most farm trucks, **Transportability** Requires dual rear wheel truck, but travels well on highway
but not ideal for long trips

~ 90 broilers per hour **Capacity** ~ 120 broilers per hour

Not all wastewater is captured; **Waste handling** All solid waste captured onboard, all mingling of solid and liquid waste; liquid waste captured separately; but but fewer surfaces to clean more surfaces to clean

Regular on-farm use for 50-300 **Well adapted for:** On-farm use for 200+ birds/batch, birds/batch, custom use for backyard use at docking stations, potentially growers USDA-licensed processing

- Workers (and possibly equipment and supplies) can enter and exit unit more freely.
- Off-unit space may be more easily utilized for waste collection, additional processing steps, or storage (e.g. setting up an extra eviscerating station, packing, storing chilled birds).
- For MPPU: Probably lighter, easier to haul, improved gas mileage.
- On a nice day, it's a more pleasant work environment.

Excluding unpaid labor (and quite a bit of it), the open-air unit cost about \$30,000 to build. Many additional staff hours went into the planning and construction of the unit. This MPPU is certainly not perfect, and has needed plenty of repairs. However, one benefit of the work that went into building the MPPU is that the

fabricators who did much of the work putting it together are local, which means they are also the ones who make repairs, tune-ups, or additional customizations. That's a good thing, since the unit has undergone quite a bit of work in the four years since it first hit the road—work which otherwise wouldn't have been done, or could have been much more costly.

The open air unit may not be well suited for highway travel (as we discovered the hard way), but a fairly small truck can pull it shorter distances without much trouble, it is no more difficult to



Open-air stationary facility at Polyface Farm. Photo: moorafarmjournal.blogspot.com

maneuver than any other 24' trailer, and it travels well off the road. Its equipment is not as efficient as the enclosed unit, so it takes longer to process the same number of birds; on the other hand, significant time is saved on processing day simply because there are fewer surfaces to clean. This unit is well adapted for processing small batches on farms in a limited geographical radius—which is precisely how it is being used.

All told, the enclosed MPPU cost over \$90,000 to build and outfit, but much less staff involvement was needed, as the unit was constructed entirely by Brothers Body and Equipment in Galion, Ohio. Although the price tag was steep, this unit is built to last and should need significantly fewer repairs and upgrades than the open-air unit has required. Theoretically, this model may be able to compete with the open-air unit in terms of feasibility by virtue of a longer period of depreciation. The shell is supposed to last over twenty years, and the equipment inside has a longer life expectancy because it is protected from the elements. If we assume that the open-air unit cost \$30,000 to build and will last 7 years, the depreciation comes out to \$4,285 per year; if the enclosed unit cost \$90,000 and lasts 15 years, it comes out to \$6,000 per year. Since the enclosed unit is able to process more birds per day, that cost difference could potentially be made up through increased throughput.

However good it sounds, though, note all the qualifiers: the enclosed unit should require fewer repairs, it will theoretically last much longer ... but if it doesn't, it will be substantially more expensive to replace than the open-air unit. Although you don't have to worry about anything flying off on the highway, the unit is still a challenge to move because of its high center of gravity and the amount of weight on the tongue (over 1,500 lbs., due to the generator mounted there), which is particularly an issue since the trailer is a bumper pull rather than a gooseneck. A heavy-duty truck with dual rear wheels (or serious modifications to the rear suspension) is required to move the unit. It also is not very well suited for roughing it off the road, and the generator's position on the tongue limits its maneuverability.

Once the unit is parked, though, it has some definite advantages, including a faster throughput and higher capacity thanks to high-quality equipment. Even the much-maligned generator turns out to be exceptionally quiet, efficient, and reliable. The enclosed unit may be good enough to meet USDA standards and may serve well as a semi-mobile unit with docking stations; however, as a unit that travels between farms and serves producers with very small batches of chickens or turkeys, the unit's size, cost, and some of its features are excessive. Our task now - as with any new slaughter facility - is to manage the MPPU in a way that plays to its strengths.

Lessons Learned: Before You Buy Anything...

Work with your regulators.

The last thing you want is to spend a lot of time and money building a new processing facility only to find out that some crucial part of it doesn't meet regulations and needs to be replaced. We learned this lesson in Massachusetts, after the open-air MPPU's floor and plumbing had to be replaced to meet code.

Admittedly, this approach can end up being a bit of a catch-22; depending on your situation, you might need to find a balance between proceeding with caution and the boldly-plowing-ahead approach. Your regulators may not have much familiarity with on-farm slaughter, so it may not be quick and easy to get clear guidance on what you are allowed to do. The best ways to move things forward seem to be:

1. Make contact with one or two essential people in the relevant agencies. (In Massachusetts this is the Department of Public Health, and to a lesser degree, the Department of Agricultural Resources.) You'll get a lot farther dealing with a specific person. And it's worth remembering, however frustrated you may get with the bureaucracy, that you'll also get a lot farther if your agency contacts *like* you.
2. Go in with plans. Just asking "What am I allowed to do?" is probably not going to get you the answers you need, and it's not an easy question to answer. Draw up plans - they don't need to be professional blueprints, but something that shows your processing flow, what materials you'll be using, etc. This way regulators can point to specific parts that wouldn't work and tell you why.
3. Be persistent. Chances are the regulators you need answers from have a lot of other things going on, and this is not going to top their list. Don't harass, but do stick with it and press (kindly and politely) for a response.
4. You need to understand the rules, too, as best you can. Know the USDA exemptions, your state's rules, and if you are dealing with local government, know your town or county ordinances too. And remember that as laid out in the U.S. Constitution, local laws can be more (but not less) restrictive than state laws, which can be more (but not less) restrictive than federal laws. See Appendix C for links to regulatory resources.
5. One other thing to keep in mind: state and local agencies may sometimes tell you what they would *like* you to do in addition to what you are *required* to do. How you handle this is your call; just be sure you understand difference between what is "required" and what is "recommended."

Don't lose track of the big picture.

Set out some parameters that you need your facility to fit within, and as you add new pieces to your plan, make sure that the final product will still fit within those parameters. Regulations are certainly one ready-made set of parameters that you have to stay within. A few others have been mentioned in this guide, including:

Management. If others will be using the facility, and especially if they will be using it without your supervision, ask yourself: Are they going to be able to operate this safely, effectively, and without breaking it?

Transportation and roadworthiness. If it's a mobile unit, ask: Will this component make the unit more difficult to transport? How will I make sure this component is secure during transport?

Site requirements / physical parameters. A good example here is the inputs that will be required on the farm (e.g. electric, water, and gas). The question to keep in mind is: What can the farmer be expected to provide? If you decide you can reasonably expect the farmer to provide a 20 amp plug which will run the whole unit, make sure that the equipment you choose doesn't compromise this; or, at least, make sure you weight that as a cost.



Chapter 3

The Components

Whether you're building the facility yourself from the ground up or paying someone else to do it, you need to have an understanding of what equipment will make the most sense for you and how the different pieces will come together. In this chapter we will discuss the components and construction of mobile and on-farm poultry processing facilities, using previously discussed examples of MPPUs and on-farm facilities.

In this version of the guide, we're short on reliable information about the best way to set up the physical plant of a stationary on-farm facility. Many of the considerations for deciding on a trailer for an MPPU also apply to stationary facilities, but a missing piece is capturing wastewater. On a trailer, wastewater can be captured underneath or alongside the processing floor, which can be relatively straightforward since the floor is elevated.

However, if the floor is not elevated—for example, in a stationary facility with a poured concrete floor—the water would normally flow into a floor drain. In Massachusetts, much of the wastewater must be captured and sent to either a compost pit or to approved sewage treatment, which means that if the floor drain does not lead to an acceptable destination for sewage, you would have to find a way to capture the water above ground rather than letting it go into the drain. Since there are so far no concrete rules on what constitutes an acceptable sewage treatment in Massachusetts, we have limited advice to offer. Of course, one way you can be sure to capture the wastewater is to build your stationary unit on an elevated floor – such as a trailer – to ensure that wastewater can be captured underneath.

If you are planning to build an on-farm facility and the section below does not prove helpful, hopefully the next version of this guide—which will include more specific advice for stationary on-farm facilities—will cover the difference.

The Trailer (for MPPUs)

The base for an MPPU is generally some sort of trailer. Trailer manufacturers do not (as of this writing) have prototypes for mobile slaughter units, so unless you are going directly to someone with experience building MPPUs, it's up to you to choose a suitable trailer that can be customized and outfitted for poultry processing. Existing MPPUs have been built on (or in) everything from equipment trailers (e.g. the open-air Massachusetts MPPU) to horse trailers (Kentucky's MPU). The enclosed Massachusetts MPPU was built in a 26' aluminum shell that might have otherwise been upfitted into mobile offices or even a mobile kitchen. Others have been built in trailers meant to haul cars or snowmobiles.

Here are a few characteristics to bear in mind in selecting a trailer:

Size. It may seem obvious, but be sure the size is appropriate. Existing MPPUs range from 18 to 36 feet in length and are generally in the neighborhood of 8-9 feet wide. Don't skimp on the length unless you plan for some processing steps to take place off of the trailer. For example, Patrick McNiff's trailer is 18', so he extends the work area by setting up the kill station on the ground behind the trailer. His suggestion, in retrospect, to anyone building a new MPPU: "Give yourself more space than you think you'll need." On the other end of the spectrum, Vermont's MPPU is 36' long, in order to include space for an onboard restroom and office area for an inspector. (In most states these do not need to be provided on the unit.) The trailer is a gooseneck, which helps with mobility.

Some producers who rent the Massachusetts open-air MPPU set up extra evisceration tables next to the trailer to make space for more workers. For both the open-air and enclosed units, packing (bagging, weighing and labeling) takes place in a tent near the unit. However, if you plan to extend the work area beyond the facility, be sure that your plan complies with regulations, especially when it comes to food safety and capturing waste.

Floor height. To a certain extent, the more space between the bottom of the trailer and the road, the better. This will be less important for some setups, but if the unit has plumbing and gas lines underneath, they will be more accessible—and safer on the road—if they are higher off the ground. (Give exact numbers) Height is especially useful (and sometimes crucial) for handling the waste coming off the unit.



Waste output pipes should be high enough to empty into bins alongside or underneath the trailer. This may be less important if you plan to pump waste directly from the unit to your compost pile. Also, there is such a thing as a floor being too high up; raising the center of gravity too high can impact transportability, especially on an enclosed unit, and a higher floor can be harder to access, especially when it comes to loading things (such as the birds themselves) onto and off of the unit.

Floor type. One of the key steps of converting a regular trailer into an MPPU is ensuring that the floor meets regulations. In some states, you might get away with a slotted wood floor; in others, you might need an impermeable sanitary surface, such as aluminum plating. This will depend largely on your state and local wastewater laws. If you are not required to capture all of the water used during processing and cleanup, a slotted floor could make more sense, but wood can be a challenge to clean and may not be as durable or sturdy as other options. Keep in mind that the floor will be subject to lots of water, the weight of heavy components, road wear, and heat (especially underneath the scald). The trailer used for the Massachusetts open-air MPPU originally had standard wood decking, but this did not meet the Massachusetts Department of Public Health's sanitation requirements. The unit now has slotted floors made of Veranda ArmorGuard composite lumber.

The enclosed unit's floor is 1/8" aluminum tread plate with the floors sloped into a single floor drain on the clean and kill side. The floor is impermeable and relatively easy to clean, but we have noticed a couple of challenges. One is that the aluminum floor could increase the chances that the electric stun knife operator gets an unwelcome shock, although this can be addressed with a removable rubber floor mat next to the kill cones. Also, if you plan to capture the liquid waste in floor drains, make sure the floor is tapered enough and that the unit can be leveled fairly well. The enclosed Massachusetts MPPU has floors that taper into drains in the center of each side, but because the floor's slope is so gradual, the unit must be very level in order to make sure water on the floor drains properly.

Transportability. The two Massachusetts MPPUs have taught us some lessons about transportability. The enclosed unit poses transportation challenges due to its size. It weighs over 9,000 lbs., which may not be a big problem in itself; however, because of the generator that sits at the front of the unit, about 1,500 lbs. rest on the tongue. This means that whatever truck attempts to pull the unit needs to have either dual rear wheels or heavy-duty single wheels; because of this extra weight on the tongue, we were unable to pull the unit with our own farm truck (a Ford F-250 with single rear wheels). The unit also has a high center of gravity because of its raised floor, making it somewhat trickier to tow, especially in windy conditions. Its size also makes it less “all-terrain” than it could be. Another issue with the unit’s off-road capabilities is that once it that it needs to be level. A heavy hydraulic jack at the front make front-to-back leveling fairly simple, but in order to be leveled side-to-side, the unit needs either hydraulic corner jacks that are hefty enough to hold its weight, or else leveling blocks to go under the wheels. (Either of these are available through most RV supply companies.)

The open-air unit has had its own traveling issues. It features a metal frame over which a canvas can be stretched to shield the clean side against rain and sun; however, if the canvas is not removed before the unit hits the road, it causes wind drag like a parachute and (in addition to very bad gas mileage) can cause damage to the frame. Even without the canvas attached, parts of the frame have broken during transport several times. (The latest incarnation of the frame has held firmly so far.) Small pieces of the unit and the attached equipment may have disappeared during transport, which is one of the downsides of an open-air unit: things can fall off in between farms! However, thanks to a protocol of securely strapping down every loose item, this has not been a serious issue so far.

It is important to match your unit—beginning with the trailer itself—with its mode of transportation. If you know what truck will be towing the MPPU, make sure you know how much weight you can pull, how much of that weight can be on the tongue, and what kind of hitch will work for you (e.g. a ball hitch, pintle hitch, or gooseneck).

Transportability concerns come into play throughout the process of planning and building a mobile unit, though they may be more or less important depending on how much the unit is anticipated to travel (e.g. frequently moving from farm to farm versus moving occasionally between semi-permanent docking stations); how it will be transported (what kind of truck is available, experience level of the driver); and how much off-road capability it will need (being used in remote fields versus parking on a concrete pad). Specifically regarding your choice of trailer, be sure that:

- You know how the unit will (or can, at least) be transported.
- You know the maximum amount the unit should weigh in order to still suit its mode of transportation.
- The axle will hold the anticipated gross vehicle weight (the amount it will weigh with all of the equipment added).
- The existing frame and structure of the trailer will be able to take the modifications you plan to make (e.g. attaching the equipment; adding lines for water, electricity and propane; adding walls or other new frame elements).
- You have a plan for leveling the unit.

The Equipment

Whether you are building, designing, or buying a poultry processing facility—and whether that facility is stationary or mobile—there are some basic components that need to be included in order to address the basic steps of processing a bird. Both the open-air and enclosed Massachusetts MPPUs have these basic components:

Electrical stunning knife (optional)
 Kill cones, with rack and drain
 Scalding
 Plucker
 Eviscerating table
 Chill tanks
 Handwash sinks

These standard pieces of equipment can be purchased from a supplier or directly from the manufacturer, or they can be custom-fabricated (some more easily than others). You don't have to go with the exact type of equipment above, either; for example, some people prefer to use a shackle and trough setup for evisceration rather than a table. However you choose to come up with the components, though, for most on-farm poultry processing facilities¹ you'll need some piece of equipment, whether purchased or homemade, at each of the basic steps of processing.

A) Stunning and bleeding

There are numerous ways to set up the killing and bleeding station, but in most every case, the bird needs to hang upside down while bleeding out. In most on-farm setups, the bird is placed upside-down into an open-ended cone with its head pulled out of the bottom. Large facilities use shackles rather than cones, hanging the birds by their feet as they move through an automated system. For small facilities, cones are generally more practical, more humane, and less messy.

Stainless steel cones are the easiest to clean and will last the longest, but they are also the most expensive. Galvanized steel cones are available, and some very small setups even use modified traffic cones. Cones should be the right size for the kind of bird being processed, in order to prevent the bird from backing out of the cone or flapping too much, which can cause broken bones or hemorrhaging in the muscles. If you are going to be processing different sizes of birds, consider a setup that allows you to use different sized cones. In order to prevent this stage from becoming a bottleneck in efficiency, be sure you have space for enough cones to let several birds bleed out at once.

You do not have to stun the bird before killing it, and stunning equipment may not be cheap, but it is certainly more humane and can be less messy, as a stunned bird will thrash around less while bleeding. There is also evidence that stunned chickens bleed out more quickly and thoroughly (although some argue



*Kill cone and rack setups.
 Top: Massachusetts open-air MPPU
 Middle: Massachusetts enclosed MPPU
 Bottom: Stone Barns Center stationary facility,
 Pocantico Hills, NY*

¹ Ritual slaughter, such as Kosher and Halal, may differ (for example, not using a scalding).

the opposite). We recommend using a stun knife. To operate a stun knife, the processor simply presses the knife against the bird's neck, pushes a button to deliver a stun that renders the bird insensitive, and makes the cut. If you are using a stun knife, be careful to keep the charge generator dry—and be careful not to zap yourself! Don't bump into the cones or rack while using the stun knife. A pair of heavy rubber gloves is highly recommended. Remember that if you are using a stun knife, the cones need to be metal and should be attached to a metal rack, and the stun knife needs to be grounded to them. Proper grounding is important both for a good stun and to prevent you from becoming the ground.

Other considerations and equipment

Blood is a small part of the waste resulting from poultry processing, but it is important to catch, contain, and properly dispose of the blood. In most setups, the cones are mounted on a stainless steel rack with a trough to capture the blood. The trough tapers into a drain with a pipe attached below it that funnels the blood into a bucket. The bucket may not need to be very large; chickens will bleed out about 3-4% of their body weight, and a volume of only about 0.02 gallons for a 4.5 lb bird. That comes out to only about 1 gallon of blood for every 50 chickens.

Common challenges

Inadequate stun – Check the dial on the stun knife and be sure it is grounded to the cones. You can also check its charge by pressing the button on the hilt to activate the charge and touching the blade against the kill cabinet or another grounded metal object.

Bird backs out of cone – The cone is probably too small. It also helps for the bird's feet to reach upward out of the cone—if they are tucked in, it may back out or get turned around during bleed-out.

Bird flapping and repositioning while bleeding out – The cone is probably too big. You may also get less thrashing during the bleed by using a stun knife.

B) Scalding

Once a bird is bled out, it moves to the scald. As any small plant operator will tell you, a good scald is essential for a good pluck. If the temperature is too low or the bird has not stayed in the scald for long enough, the feathers will not come out properly; if the temperature is too high or the bird stays in for too long, the outer layers of the skin may cook and will tear in the plucker. Whatever type of scald you choose, always monitor temperature carefully throughout processing. Keep tabs on how the birds look coming out of the plucker: are the feathers not coming out well? Is the skin tearing? Are there broken wings? Sometimes the plucker may be to blame, but often the water temperature or dunk time on the scald is the real source of the problem. For example, if birds are coming out of the plucker with broken wings, you may need for them to spend less time in the plucker; in order for that to be possible while still getting a good pluck, you might need to turn up the scald temperature or dunk the birds an extra time.

The two main types of scalds for small operations are dunk scalds and rotary scalds. A dunk scald operates just as it sounds: the birds are dipped into the water by their feet, either manually or automatically using a mechanical dunker. In rotary scalds, a tray rotates automatically, usually on a timer, lifting the birds from the water and dunking them with each pass. With both types of scalds, the birds need to be dunked and removed from the water several times in order to make sure the hot water gets under the feathers.

So which one is better? That depends on your setup, resources, and preferences—and on who you ask. Dunk scalders can be anything from a pot of hot water to a \$10,000 getup with temperature control and a hydraulic dunking arm on a timer. Generally, the bird is dunked upside-down into the hot water. For the backyard and smallest-scale producer-processor, a propane-fueled turkey cooker and a thermometer could be enough. You might just hold them by their feet, or attach a zip tie to their feet to allow the entire bird to be dunked (and keep your hand away from the 140-plus degree water). For more throughput, use a larger scalder with an adjustable thermostat and a mechanism allowing you to dunk multiple birds at once. This usually involves putting the birds' feet into metal shackles.

Some processors (and certainly the dunk scalders' manufacturers themselves) swear that dunk scalding is the best way to loosen the feathers. Aside from some of the fancier automatic models, dunk scalders are generally more inexpensive than rotary scalders—probably their main advantage. The main drawback is that most dunk scalding setups will require someone to manually dunk the birds, increasing the kill side labor requirement. However, this may not always be an issue, as Jim McLaughlin of Cornerstone Farm Ventures points out. "It's something a ten-year-old kid can do without being in harm's way."

Rotary scalders are a little more involved in their construction, but can make for a more efficient kill side, especially when larger throughput is needed. Rotary scalders generally require an electric motor. The tank is usually rounded at the bottom, with a rotating metal tray attached to a bar extending across the middle of the tank, just above the water level. The operator lays the birds on the tray, pushes a button, and the tray turns like a sideways revolving door, pushing the birds in and out of the water. Design details differ, but the tray should not be solid; there need to be holes for water to be pushed through and agitated so that it can get beneath the birds' feathers for a good scald.

Most rotary scalders will have a timer and thermostat, allowing the operator to simply lay the birds in the scalder, turn on the rotation cycle, and do other work until the cycle automatically stops. With a good rotary scalder, the entire kill side can be efficiently operated by one person. The main drawback is that rotary scalders usually cost more than dunk scalders. There are also more moving



Top: Rotary scalder (Ashley AM30), Massachusetts enclosed MPPU

Middle: Rotary scalder (Poultryman), Massachusetts open-air MPPU

Bottom: Dunk scalder, Harmony Acres (<http://get-smelly.blogspot.com/2010/05/chicken-processing-day.html>)

parts that could break or wear out.

Common challenges

Water temperature too low or takes too long getting up to temperature initially – This may mean you have a problem with the burner or inadequate propane delivery. As a temporary fix, you can use a turkey cooker or stovetop to heat extra hot water to dump into the scaldler, or you can apply a blowtorch under the scaldler to augment its burner. Ultimately, you'll want to fix the source of the problem – which might simply be that you need a better burner.

Water temperature too hot – If the burner doesn't adjust on its own (depending on whether you have a working thermostat on the scaldler), you can bring the temperature down by simply adding cold water. When you add water, you should also let some out in order to keep the right water level.

If your facility is indoors or enclosed, some scalders may need a vent to the outside. The scaldler should come with a vent output; you just need a hole in the wall or ceiling to connect it to. You can see the vent output on the Ashley AM-30 scaldler in the enclosed Massachusetts MPPU (see top image on previous page).

Also remember to look carefully at the scaldler's specifications, especially its physical dimensions (will it fit in your facility?) and power requirements. Some scalders are 220V rather than 110V, which could alter the electrical requirements for the entire facility.

Propane and BTUs

Some scalders may be able to operate on natural gas, but the more commonly used gas source is propane. You can use a standard propane cylinder, like the one you hook up to a gas grill, but be sure to match the size of the cylinder to the BTU requirements of the scaldler. For example, a 20 lb. propane cylinder has about a 430,000 BTU capacity when full. If a scaldler's burner is listed at 60,000 BTU, this represents the amount of thermal units it will burn per hour at full capacity. Theoretically, you can calculate how long a propane cylinder will power a scaldler by dividing the cylinder's BTU capacity by the burner's BTU listing. For example:

$$430,000 \text{ BTUs (20 lb. propane cylinder)} / 60,000 \text{ BTUs (scaldler)} = 7.2 \text{ hours}$$

This means that in perfect conditions, one 20 lb. propane cylinder should power a 60,000 BTU scaldler for a little over 7 hours. However, you should always treat this figure as an unrealistically optimistic estimate, especially as the scaldler's BTU rating goes up. For one thing, you probably won't always be starting off with a full propane cylinder. You also could have a small leak or other issue with your propane line that isn't enough to prevent the burner from working (so you might not notice it) but still interferes with propane delivery. For higher BTU scalders, the math is especially unreliable, as a small cylinder is likely to freeze up well before it actually "runs out" of propane. In short, when you start drawing from a cylinder, the liquid propane boils and releases propane gas. If it boils too quickly, the pressure can drop to the point that the liquid propane freezes. (This also will happen faster if the



ambient temperature around the cylinder is colder; you may want to somehow insulate the cylinders if you're processing outdoors in winter.) You may see a frost line around the outside of the cylinder when this happens; or the freezing could happen in cylinder's valve or the hoses, in which case there may not be any visible signs. Some will pour hot water over the area that seems to be frozen, though we wouldn't necessarily endorse this - you can also just switch the cylinder it out for another one. Better yet, use a larger cylinder and avoid the problem altogether. While the 60,000 BTU Poultryman scalding works fine for hours hooked up to a single 20 lb. propane cylinder, the 125,000 BTU Ashley AM-30 scalding is too much for even two 40 lb. cylinders to handle for more than a couple of hours in warm weather, but it works like a charm (so far) when hooked up to a 100 lb. cylinder.

One more important note: make sure the propane line goes through a regulator - don't just hook the cylinder directly to the scalding. The regulator takes the wildly variable pressure coming out of the cylinder and releases it at a constant rate. The scalding's user manual should provide guidance on using the right regulator, or you can call the manufacturer. Usually you should be able to use a simple propane bottle regulator like you would with a grill, attached directly to the propane cylinder's valve. The enclosed Massachusetts MPPU uses a Type R962 Automatic Changeover Regulator, which allows two propane cylinders to be hooked up at once; when one cylinder runs low, it automatically switches to the other.



Top: Propane cylinders connected to regulator with changeover valve.

Bottom: Propane cylinder with standard regulator attached.

C) Plucking

If you plan to process more than a few birds and you have thoughts of plucking all their feathers out by hand, you might want to rethink that plan. A good plucker (or picker, as some call them) is a crucial step for an efficient processing setup. The two main types of pluckers for small operations are tub pluckers and tabletop pluckers (sometimes called drum pluckers). A tabletop plucker will usually only make sense for small operations with a limited budget. While the drum spins, the operator presses the scalded bird against the drum's rubber fingers, which pull out the feathers. While tabletop pluckers may do a fine job, and in some cases may not require electricity, they essentially require one worker to be the dedicated plucker, and only one bird can be plucked at a time. An advantage of tabletop pluckers is that the operator has more control of the plucking, which can mean a more thorough pick and fewer broken wings; but this option really only makes sense if you are doing very small batches.

For most facilities, a tub plucker will be a better choice. A tub plucker can pluck several birds at once, significantly reducing the kill side labor requirement. In some models, when the plucker is on a timer and broken wings are not a problem, the operator can put the birds in the plucker and walk away

to do something else. Even if the operator needs to stay at the plucker while it is in use, tub pluckers are usually considerably more efficient—and far less physically demanding to use—than tabletop models.

Tub pluckers vary by size, energy requirements, and the presence or absence of a few extra features, such as:

- Spray nozzles or rings – Having a fixed nozzle or ring to spray water into the plucker frees up a hand that might otherwise have to manually spray the water.
- Timer – This lets you set a uniform time for birds to spend in the plucker before it either stops spinning or else deposits them out a kick-out door. The water might also operate on a timer set to the same cycle.
- Kick-out door – Helpful in some setups, and a necessity if the unit has a continually spinning motor, which reduces wear caused by starting and stopping the motor for each cycle. The Knase/Pickwick SPJ model is an example of this: the disc at the base of the plucker spins continuously, and when birds are done being plucked—either because the timer ran out or because the operator pushes the button to manually end the cycle—the kick out door is unlocked, and the centrifugal force of the spinning birds knocks it open and deposits the birds onto a catch tray on the “clean side.”
- Loading/unloading trays – It can be helpful to have a place to set birds that have come out of the scalder if they are not going immediately into the plucker. An unloading tray is probably less important—unless your plucker has a kick-out door, in which case there needs to be a tray (with a fairly tall backstop and sides) to catch the plucked birds as they come flying out. Loading and unloading tray may be available from the plucker’s manufacturer, but you may be able to make or find your own for quite a bit cheaper.

In most pluckers designed for small facilities, feathers and water simply drop to the ground below. This doesn’t need to factor into your choice of plucker - most operations just accept that the feathers will have to be cleaned up afterward - but it is something to keep in mind as you design the kill side. You might want to add a makeshift barrier to keep feathers from



*Top: Stainless steel drum plucker (Knase/Pickwick SPJ30) Massachusetts enclosed MPPU
Middle: Plastic drum plucker (Featherman), Stone Barns Center
Bottom: Tabletop plucker (Berry-Hill Limited Farm Supply)*

getting under the scald or otherwise contain them, or to channel the water directly to a drain (if you have an impermeable floor), or you might save cleanup time by making it possible to move the plucker when you're done with it. In a stationary facility, you may have enough space to set up the plucker far enough away from walls or corners to prevent feathers from ending up in hard-to-reach places.

Thanks to some clever designing and custom fabrication, the open-air Massachusetts MPPU's Poultryman plucker is fitted with a chute that directs most of the water and feathers into a tub. It's a handy upgrade, but be advised that it's tricky to pull off well. In this case, the motor had to be moved out from underneath the cylinder - not a job for the inexperienced. If this goes wrong, you can bet it doesn't fall under your manufacturer's warranty!

Common challenges

Inadequate feather removal – Often, a problem with plucking is actually a problem with scalding, so keep close tabs on the scald's temperature. An underscalded bird will not shed its feathers well in the plucker. If you determine the scald was not the problem, you may simply be leaving the birds in the plucker too long or not long enough, or else you may have too many or too few birds in the plucker at once, which results in poor plucking.

Bird loses skin in plucker – This is another scald problem, indicating the bird was scalded too long or at too hot a temperature.

Broken wings – This can happen if there are too few birds in the plucker or if they birds are plucked too long.

As with the scald, remember to look carefully at the plucker's specifications, especially its dimensions (will it fit in your facility?) and power requirements. Some of the best pluckers are 220V rather than 110V, which could alter the electrical requirements for the entire facility.

D) Pass-through, head and feet removal

After the feathers have been removed and before it can be eviscerated, the carcass needs to

cross from the "kill side" to the "clean side." This may be the most variable and unscientific step of the process. While our protocol on the mainland Massachusetts MPPUs is to remove heads and feet after birds come out of the plucker, some may do so earlier (heads especially) or later in the process. If you are selling the feet, you will probably want to peel the yellow sheath off of them. If the bird had



a good scald, the sheath may have already come off in the plucker. Use poultry shears or other heavy-duty clippers to remove heads and feet. Aim to separate feet between the “knee” joints (the tip of the drumstick) and heads wherever the initial cut was made at bleeding. If you are keeping heads and feet for sale (as you should, for ethnic markets or for dog owners - nothing wasted!), they need to be chilled after removal, just like giblets and whole birds. We keep buckets of ice water labeled “heads” and “feet” near the pass-through area.

The pass-through can be as simple as someone on the kill side taking the birds from the plucker and handing them to someone standing on the clean side. In the enclosed Massachusetts MPPU, the two sides are divided by a wall with an opening next to the plucker. When the plucker’s kickout door opens, the birds tumble out onto a table on the clean side, where a worker removes heads and feet (putting them in ice buckets to chill) and either passes the carcass directly to someone at the evisceration table or, if there is a backup at the eviscerating station, sets the bird in a holding tank. On the open-air MPPU, the plucker stops spinning when the batch is done, and the kill side operator removes heads and feet before passing the bird to the holding tank on the clean side.

Have somewhere to keep birds that are “in limbo” between the kill side and the evisceration table, in case the evisceration side workers have trouble keeping up with the kill side’s output (as often happens). This could simply be a table or bin, or it could be a tub of cold water or ice water to start bringing the birds toward 40 degrees F.

E) Evisceration

There are two primary types of evisceration stations in small processing facilities. Larger plants usually use a shackle system, while smaller on-farm operations often eviscerate on a table. However, shackles can also be adapted for use in many smaller-scale setups. The basic elements of the evisceration system are somewhere to set or hang the carcass while a worker eviscerates it, a source of water for rinsing the carcass and contact surfaces, and somewhere to discard of the waste (inedible



*Top: Pass-through on enclosed Massachusetts MPPU, with kickout door from plucker
Middle: Kickout door in action (a plastic “backstop” was later added to the catch table)
Bottom: Pass-through window, Stone Barns Center*

parts, such as the intestines, as well as rinse water). You may also wish to think about a convenient place to put edible giblets, such as hearts, livers and gizzards, so that they can be packaged later.

No matter your system, it is absolutely essential that any surfaces the carcass will come into contact with are sanitary and easy to clean. Stainless steel is recommended for most contact surfaces and tools. A less obvious point—but one that regulators may be watching out for—is the type of hose used for rinsing off the carcass after evisceration. In Massachusetts, this hose (and any other hoses the water will pass through on its way from the faucet to the clean side) must be food grade. Most regular garden hoses don't qualify since they are not lead-free. Lead-free hose can be purchased at many hardware stores.

Whether you should go with shackles or a table is mainly a matter of preference. Some experienced poultry processors swear by shackles as being more efficient and safer for the worker, and there are also fewer surfaces for the carcass to come into contact with. A shackle setup is usually going to be a bit more expensive than a table, but certainly may pay for itself and then some through improved efficiency. However, both mainland Massachusetts MPPUs use stainless steel tables since it was the method we were familiar with, and aside from some small design problems (e.g. water pooling on a table that does not taper properly into its drain), the table system has worked well for us. One Massachusetts farm which draws a large amount of volunteer labor on processing day was able to expand the evisceration station by setting up food-grade plastic tables next to the open-air MPPU. Jim McLaughlin of Cornerstone Farm Ventures find shackles to be more efficient, but he says that ultimately, it's a matter of which method of evisceration you feel more comfortable with.

If you are aiming for a larger throughput—and have enough money—you may opt for equipment that adds automation to evisceration. In the large USDA-inspected processing plants that handle the majority of the poultry meat processed in the U.S., evisceration (along with the rest of processing) is almost entirely mechanized. Advanced evisceration equipment, such as a Vac-Air system, could eliminate the labor bottleneck of a small processing operation and significantly increase the number of birds that a facility can process in a day; however, it may be prohibitively expensive and take up more space. The jury is still out on whether Vac-Air is compatible with MPPUs; Ed Leonardi of Hudson Valley Poultry Processing will be the first to try it out in a mobile unit.

Common challenges

Efficiency problems – Evisceration tends to be the bottleneck of the small processing operation in terms of time and labor. It may take four efficient eviscerators to keep up with one efficient kill side operator—possibly quite a few more if the eviscerators are inexperienced. Adding more mechanization on the eviscerating side might address this, but the tried and true approaches for small processing



Eviscerating tables in use, Massachusetts open-air MPPU

setups are to match the kill side output with well-trained, speedy eviscerators ... or with sheer numbers. At Pete & Jen's Backyard Birds in Concord, Mass., there may be a dozen people (of all experience levels) eviscerating chickens while only one or two people operate the MPPU's kill side.

F) Chilling

After evisceration, any part of the bird intended for human consumption needs to be immediately chilled. In order to ensure the safety of the meat, the carcass and giblets need to be cooled to an internal temperature of 40 degrees Fahrenheit within 4 hours for a 3-4 lb carcass, 6 hrs for a 5-8 lb bird, or 8 hrs for birds over 8 lb. While chilling can be done in a separate area—for instance, in a separate room or in tubs on the ground next to an MPPU— a chill tank, cooler or freezer needs to be located near the evisceration station to reduce the distance workers need to carry a bird, reducing both time spent away from evisceration and the likelihood that a bird gets dropped on the floor. For giblets, smaller containers (marked “edible” and stocked with ice) should be placed somewhere easily accessible to workers at eviscerating stations.

Placing eviscerated birds into a tank of ice and cold water is a quick and relatively easy way to chill carcasses, as opposed to putting them directly into a freezer or cooler. Depending on the temperature and the insulation of the tank, a baseline estimate is 1 pound of ice for each pound of meat; use more ice for poorly insulated tanks on hotter days, less if you are processing turkeys on a cold November day.

Chill tanks come in many different shapes, sizes and materials. While some poultry processing equipment companies sell chill tanks, you might save money by shopping around and by using other sorts of tanks or containers, such as bulk milk tanks. A simple plastic barrel could work [see image], but other features can add convenience, such as:

- Insulation – This can reduce the amount of ice needed, saving you both money and the time you might have otherwise spent adding ice to the tanks.
- Drain spout – After all of the birds have been pulled from a chill tank, you still need to dispose



Top: Chill tank used for open-air Massachusetts MPPU
Middle: Chill tubs used in enclosed Massachusetts MPPU
Bottom: Checking internal temperature of chicken

of the water, and it's nice not to have to tip the whole thing on its side to empty it. This also makes it easier to let some of the water out if you want to increase the ice-to-water ratio in the tank.

- Wheels – When the tank is filled with water, ice, and processed birds, it is no fun to move. A hand truck could substitute.
- A lid – You don't have to have a lid (unless your local or state regulators require it), but if the tanks aren't being stored under a roof, it would be a smart idea. This can also provide you with a temporary spot to put odds and ends, which counts when space is at a premium!

Remember that at this point you are storing the product that you are going to hand to the consumer, so it should go without saying that chill tanks need to be thoroughly cleaned and sanitized before use. Avoid tanks that would be difficult to clean well. Watch for scratches or other damage on the inside of a tank which could harbor bacteria, and of course be sure the material itself is safe for food storage.

Any container storing edible products—chill tanks for whole birds, ice buckets for giblets, feet and heads—should be well labeled. We always label giblet buckets according to what goes in them (“livers,” “hearts,” “gizzards,” and “necks” if you're removing them); if you don't, some parts are liable to end up in the wrong bucket. Labeling chill tanks is also crucial for temperature monitoring. The large chill tanks used on both Massachusetts MPPUs are labeled A, B, C etc., so that the temperature of the water and a sample carcass in each tank can be monitored and recorded. Massachusetts state law requires us to choose a sample bird each hour and track its internal temperature for each hour after that to make sure it cools below 40 degrees F, the temperature at which bacterial growth slows to a crawl. This is a good practice whether or not regulation requires it, and need not be a hassle; we simply attach a colored ziptie to the sample bird, note which chill tank it went into, and set a timer to go off each hour. When the timer goes off, the next bird into the chill tanks gets a new color of ziptie, and someone checks up on the temperatures of that bird and the others with a meat thermometer, entering the temperatures into a log. [See our **Farm and Food Safety Management Guide** for sample logs and more food safety information, available at New Entry's web site: www.nesfp.org.]

A large freezer also comes very much in handy for on-farm processing—and if the birds will be marketed frozen, of course, freezer space is mandatory. Even if the birds will be sold the same day that they are processed, some sort of cold storage will be needed. Well maintained chill tanks get carcasses cold quickly, but will keep them cold only until the ice melts. In addition to storing birds after processing, the freezer can hold ice before processing, eliminating the need to buy ice early on the morning of processing day (or an ice machine).

G) Packing

After carcasses have been chilled (or perhaps before, if you have a reliable way to air-chill them quickly), they will need to be packaged. There are many different ways you may choose to package your product, from shrink bags for whole roasting chickens to plastic tubs for giblets to breaking the carcass down into parts to vacuum-pack. Whatever your process, packing must take place on a sanitary surface. The safest bet is to



have a work area devoted to packing, but if space is especially tight in your setup, you could also opt to hold off packing until after evisceration is finished, meticulously clean your eviscerating table or other surfaces to be reused, and do your packing there.

With MPPUs, you may be allowed to do your packing off-unit, as has become standard procedure for the Massachusetts MPPUs. Most of these units' producers set up a tent and food-grade plastic folding tables on the ground next to the unit's clean side and designate it as the packing area. Birds coming straight out of a chill tank will have accumulated water and should be drained. See this guide's Appendices for the plans to make your own drainage rack, like the one you see on page 32. This is also handy for packaging the birds—just pull the bag down over the bird, twist it, and seal it (we use metal crimps for that). This is also a good time to weigh and label your final product before moving it to its next storage space or handing it directly to the customer.

Other equipment and facility considerations

Handwashing sinks. In Massachusetts, processing facilities are required to have a handwashing sink on both the kill and the clean sides. The sinks also need to be hands-free operable and to have both hot and cold water. Many restaurant supply companies sell foot- or knee-operated sinks. This requirement can be an obstacle for very small facilities, such as some of the more barebones MPPUs with limited space and plumbing. However, these sinks do not need to take up much space at all; and besides, they are a very good idea, since requiring everyone to thoroughly wash hands with soap before leaving the processing area is probably the surest way to prevent workers from getting salmonella or campylobacter and to prevent cross-contamination. Of the thousands of people who have consumed chickens and turkeys that were processed on the Massachusetts MPPUs and the 200 or more who have helped on processing day, the only cases of salmonella or campylobacter that we are aware of were two individuals who became ill after working on the kill side on processing day. Both fully recovered, and it is hard to say with complete certainty that either contracted the illness from processing, but it certainly serves notice: the possibility of customers and especially workers becoming ill is not just hypothetical.



Hot water heater. This is where the handwash sinks can be a challenge. Plumbing cold water to the sinks is simple, but hot water requires a separate electric or gas water heater. Many favor gas heaters, and these may be more economical, but on the open-air Massachusetts MPPU the gas-powered water heater had an infamously fickle pilot light which could take ten minutes to light and sometimes turned off after a while. The electric water heater on the enclosed MPPU works like a charm, but was significantly more expensive than the propane-fired heater.

Poultry crates / holding area. The live birds need to be kept somewhere easily accessible by whoever is operating the kill station. We recommend Kuhl poultry crates (see image above) for transport and for holding chickens before processing. You probably can't keep all of the crates within easy reach of the kill station, but it's helpful to have a place where one or two crates at a time can sit within reach of the kill side operator. Be sure that the crated birds are kept in a comfortable environment to reduce stress before processing, and be especially careful to keep the birds under shade area on hot days to avoid losses.

Inputs

You could conceivably build a small-scale processing facility where the only input is water coming out of a garden hose; however, the more birds you need to process, and the more efficiently you wish to process them, the more important inputs become. There will still be some variation depending on your choice of equipment - for example, whether you go with an electric or gas water heater. Despite their rather different outward appearance, the two Massachusetts MPPUs are similar in which inputs are required at different steps:

	Enclosed MPPU	Open-air MPPU
Stun knife	Electric	Electric
Scalder	Electric, propane, water (plumbed)	Electric, propane, water (manual)
Plucker	Electric, propane, water (plumbed)	Electric, propane, water (plumbed)
Eviscerating station	Water (plumbed)	Water (plumbed)
Sinks	Water (plumbed)	Water (plumbed)
Water heater	Water (plumbed), electric	Water (plumbed), propane
Chill tanks	Water (manual)	Water (manual)
Lights	Electric	N/A
Generator	Diesel	N/A

Electricity. Electricity can be provided either onsite or by a generator. Most MPPUs require onsite electricity. This is often simpler for the unit owner/manager since generators take up space, add weight, and can cost a bit of money. It should probably be your default option, unless it is going to cause problems on the farm - for example, if the unit might need to be used somewhere far from appropriate electrical access or might require a heavier-duty plug than the farmer can provide.

It is important to know what the power requirements will be and assess whether farms will be able to provide it on site. The open-air MPPU runs on a standard three-prong 110v outlet, since all of the components requiring electricity (stun knife, scalder and plucker) only require 110v. However, when heavy-duty equipment is added, a heavier-duty plug is needed. Because of its increased power load, the enclosed Massachusetts MPPU requires a 50 amp plug, the type of plug you might need for a dryer or refrigerator. The Hudson Valley Poultry Processing MPPU, built by Ed Leonardi in upstate New York, requires the farmer to have a 100 amp service outlet. In Massachusetts, we determined that relying on farmers to have a 50 amp plug on site would exclude many potential MPPU users. Rather than scale back the equipment onboard, we added a generator that was big enough to power the whole unit.

On top of the upfront expense, generators require the additional input of gas or diesel, and can be loud and unreliable, depending on the model. Our Onan 10 horsepower quiet diesel generator cost around \$10,000, but it has proven remarkably quiet, efficient and reliable, and has allowed the enclosed MPPU to operate in locations far away from any electrical outlet. However, the generator had to be mounted on the tongue of the trailer, bumping up the weight on the tongue to over 1,600 lbs. and making it much more difficult for small trucks to pull the unit.

Water/plumbing. Plumbing does not need to be complex; for a simple setup, you might opt to simply run a hose directly to each spot where water is needed on processing day. For example, you can fill

a simple dunk scalding by just dropping a hose in it before processing, rather than plumbing a connection. However, a bit of extra onboard plumbing can be very helpful to make sure some steps run smoothly. If your state requires you to include sinks and a water heater onboard, some plumbing will certainly be needed to connect these. You may also find it most convenient to plumb directly to your plucker (most pluckers are set up to fit a regular garden hose input). For any water that will be coming in contact with food products--anything on the clean side, in other words--make sure that all the way from



Propane connections and regulator (left), diesel generator on Massachusetts enclosed MPPU

the tap to the bird, the water flows through food-grade (lead-free) hoses and pipes. Regular garden hoses are not lead-free, but you can buy lead-free hoses at a hardware store for a bit more. PVC pipes also need to be made of approved material. PVC marked “NSF-PW” or “NSF-61” is designed for potable water applications; alternative code such as “NSF-DWV” is not.

Since there will likely be multiple people at the eviscerating station needing to rinse carcasses (and rinse the work surface between birds), it makes sense to have multiple hoses or nozzles available. Some eviscerating tables come already plumbed (see Appendices for product details), but you can also do it yourself to have more control over the setup. If one incoming hose is divided off into four hoses at an eviscerating table, it can make things much more convenient. The one catch is that if water pressure is not good to begin with, having multiple people using the hoses at once could reduce it enough to be an issue. Good water pressure is needed both at the plucker and at the evisceration station, as well as during cleanup. The inflowing water pressure needs to be strong, and the more direct a route it travels from spigot to nozzle, the better. Although it should not be required, you can also use a water pressure booster pump to counteract weak on-site water pressure.

You might also be required to include a backflow device. This is meant to protect the on-site potable water source from contamination. A backflow preventer valve could cost anywhere from \$50 to \$300. The valve is best placed near the water input (where the hose hooks up to the unit/facility’s plumbing) so that all incoming water flows through it. This would also be a good place to put a water meter, if you want (or are required) to include one.

Gas (propane or natural gas). The scalding burner is commonly gas-fired, and your water heater might be as well. There are many ways you could decide to set up your propane or natural gas delivery system, but our experience is generally “the simpler the better.” The longer and more complex the path gas travels from tank to burner, the more opportunities are introduced for something to go wrong along the way.

This will depend on the requirements of your equipment, of course. A burner with higher BTUs will need more pressure. If you are using propane, most scalding burners will need at least a 20 or 40 lb. tank. The Massachusetts open-air MPPU includes a rack and connections for two 20 lb. propane tanks, which are connected to a changeover valve. The enclosed unit includes racks for two 40 lb. tanks, though larger tanks

may also be used, also hooked up to a changeover valve. The valve automatically switches to whichever tank has higher pressure, drawing down the two relatively equally.

Air pressure. A few pieces of equipment could require you to provide a certain amount of air pressure in place of electrical power, although this is uncommon. The Knase Dunkmaster, a dunk scalding, requires a 3/4 or 1 horsepower air compressor producing 120 psi of air pressure to power its dunking mechanism.

Waste management

Waste handling. Before putting the unit together, you should know: a) Which waste you need to capture; b) how you are going to capture it; c) where it needs to end up; and d) how it's getting there. This means not just having a place to catch and keep any liquid and solid waste that you are required to catch, but also having a plan for getting that waste off of the unit and to wherever it needs to end up (probably a compost pile). For example, here is how the Massachusetts MPPUs handle those questions:

	Enclosed MPPU	Open-air MPPU
a) Which waste needs to be captured?	All solids (blood, feathers, offal); wastewater containing solids (water from plucker, scalding, evisceration, and initial post-processing cleanup)	All solids (blood, feathers, offal); wastewater containing solids (water from plucker, scalding, evisceration)
b) How is it captured?	Onboard, in buckets (blood, offal) or on floor (feathers); liquids flow into floor drains and into a single tub off-unit	In separate tubs alongside the unit (solid and liquid together)
c) Where will it end up?	In a compost pile	In a compost pile
d) How is it getting there?	Solids hauled with tractor or by hand; liquids pumped directly to compost pile via sump pump in the off-unit collection tub	Each bin, containing solids and liquids together, hauled to compost with tractor or by hand

We have found that keeping solid and liquid waste separate can be very helpful. With the possible exception of feathers, you may be able to store all solid waste onboard until processing is done. Wastewater tends to build up, but having known the joys of hauling 100-gallon drums of processing waste soup to the compost pit, we designed the enclosed MPPU to catch all solid waste onboard and catch all liquid waste in floor drains, with all of the wastewater exiting through a single pipe into a 40-gallon tub. From there, it is pumped by an electric sump pump directly to a compost pit, perhaps as many as 100 or more feet away. This means the farmer does not need to have the capacity to catch and store all of the wastewater produced during processing. Someone will need to check on the pump every so often during processing, and it would be very wise to have a backup plan in case something goes wrong with the pump (such as a backup pump or a way to haul the tubs to compost if the pump fails); however, if you have no pump, unless you have enough waste tank capacity to hold all of the day's processing water, someone will need to haul wastewater to compost by hand or with a tractor during processing.

Cleanup. Remind yourself often that you will have to clean the space after processing. You may not save yourself as much time as you think with a super-efficient design if it adds too much cleanup time. Be especially conscious of this when you think about how and where to install the plucker; otherwise, when you start cleaning up after a long day of processing, feathers will become the bane of your existence. The

open-air Massachusetts MPPU has a custom-fabricated chute to catch feathers as they fall out of the plucker. The enclosed unit does not, but we have discovered that the feathers tend to stay fairly well contained below and around the plucker if they are not allowed to build up too much during processing. You may wish to fashion a barrier to keep feathers underneath the plucker, and especially to prevent them from getting underneath the scalder.

Also be cognizant of the surface areas you will need to clean, and how you are going to reach them. Use washable materials such as stainless steel, aluminum plating, and impermeable hard plastics. Anything that will soak up water (such as wood) is bad news. Feathers, blood, and dirt will find their way into nooks on the kill side, so if the equipment is bolted down permanently, it bears repeating: know how you are going to clean any hard-to-reach places. The most likely trouble spots are behind and underneath the scalder and plucker. In fact, the fewer “nooks,” the better.



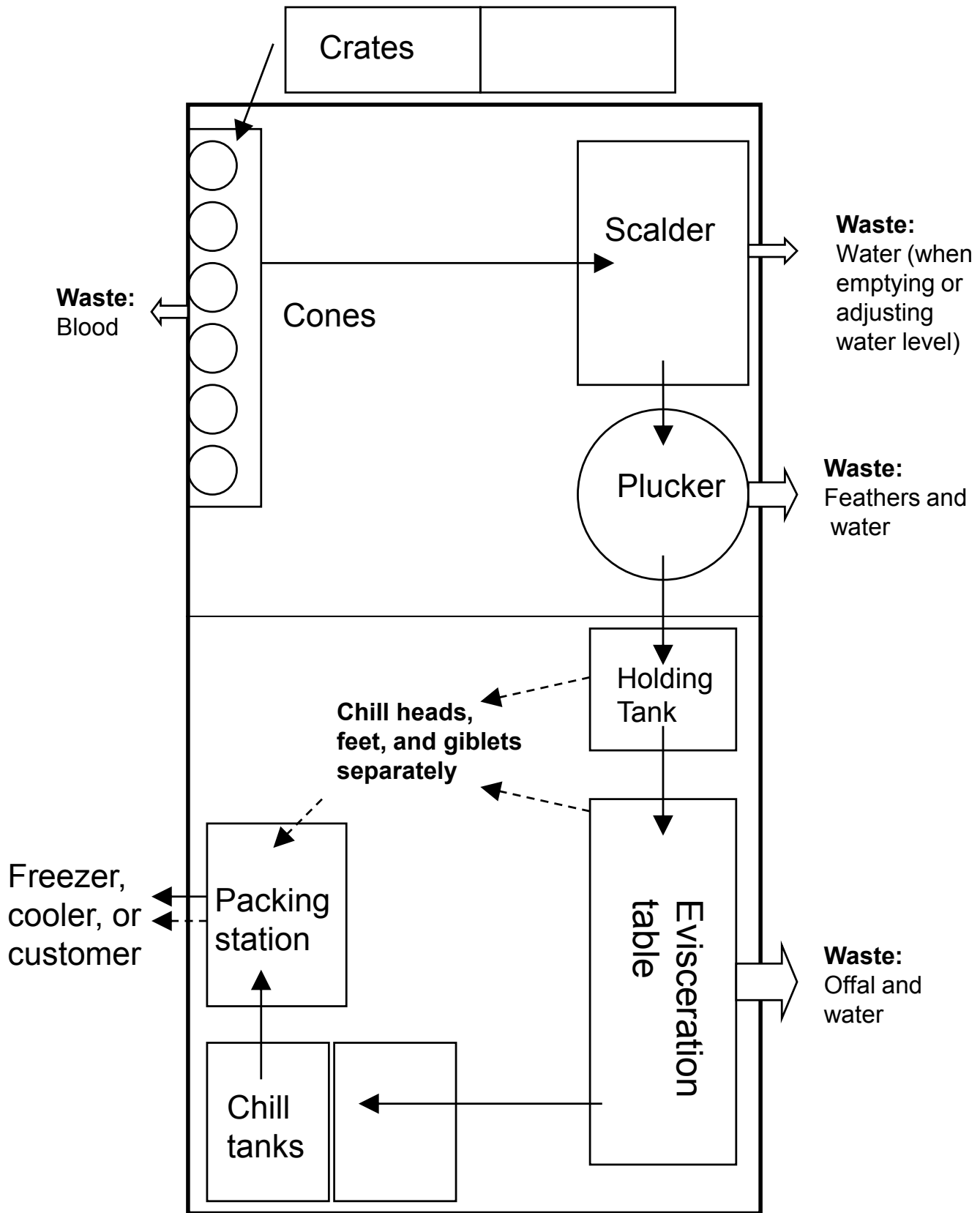
“Offal soup,” the product of mingling solid processing wastes with wastewater. Here a sump pump is sending the liquid waste to a compost pile, with a screen preventing (or attempting to prevent) the solid waste from clogging the pump.

If there’s anything that can’t get wet (e.g. the stun knife’s charge box, electrical outlets) make sure it can be either removed or covered when it’s time to clean up. Having at least decent water pressure will make your life easier during cleanup. We fantasize about having a high-pressure washer travel with the MPPU, but a garden hose with a spray nozzle and a good sponge mop should get the job done. (Our cleanup process also involves scrubbing contact surfaces with Simple Green and green scrubby sponges, rinsing everything again with water, and as a final step, liberally spraying a bleach mixture on all contact surfaces and leaving it to air dry.)

Other considerations

Safe travels. For mobile units, make sure everything is securely fastened or can be secured while the unit is traveling. This does not necessarily mean that every piece of equipment must be firmly bolted or welded in place; for example, it is useful to be able to reposition cones on the kill rack and to remove chill tubs from the unit. Just be sure that once the unit starts moving, those things aren’t going anywhere. This is obviously especially important in an open-air unit, where pieces can literally be lost along the side of the road—and yes, we know this from experience. On the enclosed unit, the kill cones are not fastened to the wall during processing, but they—and any other items that might slide around, such as chill tubs, waste tanks, and boxes of supplies—are securely strapped in place before the unit is transported anywhere. Rings are fastened in several places on the floor so that we have somewhere to hook the cables—something definitely worth thinking about when you are putting the unit together rather than assuming you’ll just figure it out later.

Process Flow with Waste Outputs



KEY —▶ Whole bird / carcass
 --▶ Giblets / head / feet

The Floor Plan: Capacity, Efficiency, and Practicality

Your individual equipment choices will play a large role in the capacity and efficiency of your facility, but what you are really doing with your equipment selection is both setting the ceiling on both how many birds can be processed per hour and setting the floor on how many workers will be needed to reach that capacity, or to at least operate the facility practically. Ultimately, the efficiency and capacity of your setup largely comes down to two factors:

1. How many birds can be processed per hour?
2. How many people will it take to accomplish this?

Ultimately, when you are thinking about equipment capacity, labor requirements, or general workflow, you are looking for the bottlenecks. A tomato plant can have all the sun and water it needs, but it won't produce without enough nitrogen; a poultry processing facility can have plenty of labor and state of the art equipment, but if the plucker is too small or there aren't enough kill cones, some of those workers are going to do a lot of standing around.

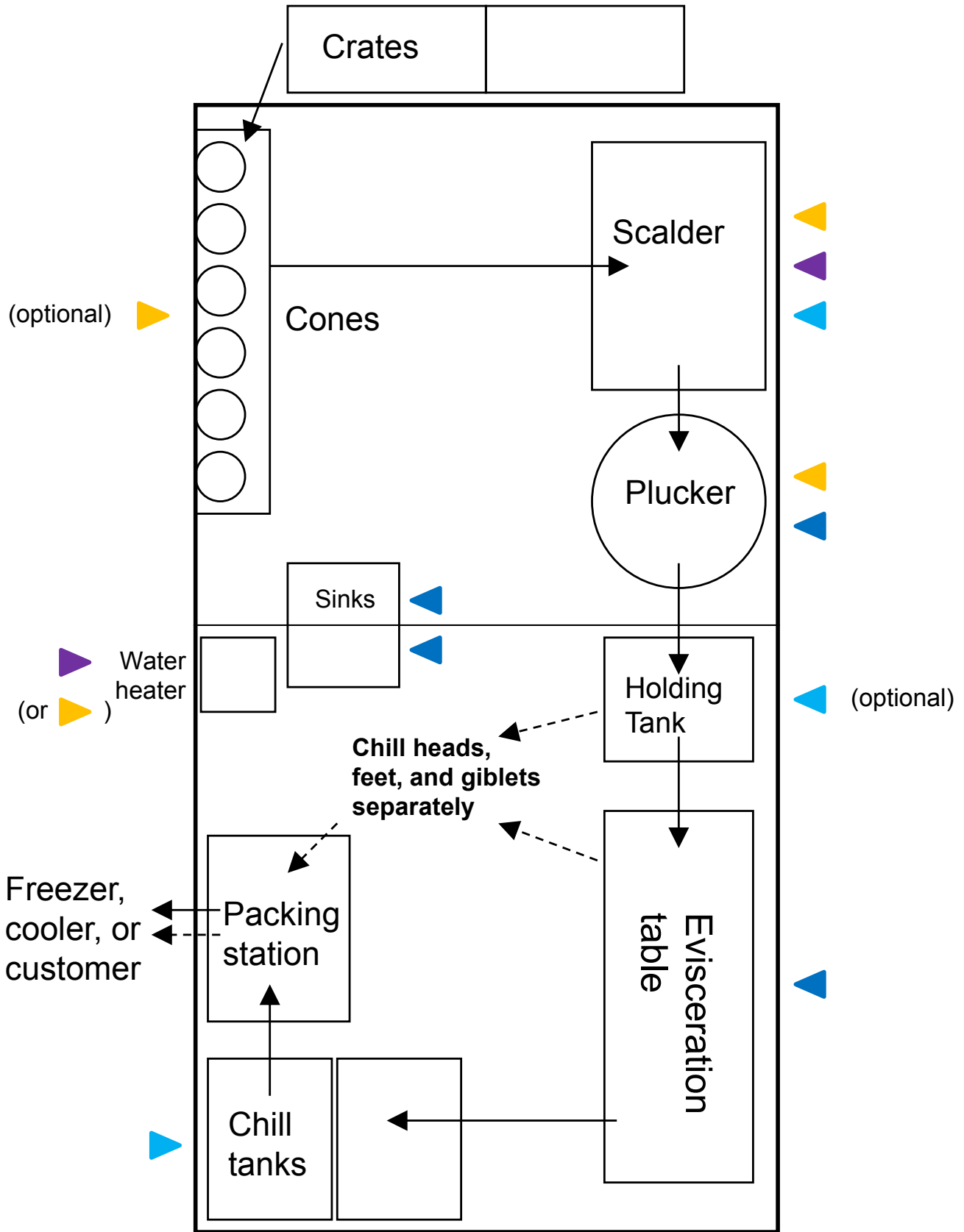
Estimating capacity and addressing bottlenecks

It may be most practical to think of a facility's capacity in terms of the number of birds that can be processed per day. There may already be a maximum number of birds you are able to process in a day, whether because of regulations (Massachusetts regulators set 400 broilers per day as the maximum for processing on the MPPU) or for practical reasons (e.g. freezer space). Also think about the minimum number of birds you want the facility to be able to do in a day, and make sure the equipment's capacity puts you well above that number. Remember that any figures the manufacturer gives you relating to equipment capacity represent the ceiling. If a scalding or plucker is listed as being able to handle a certain number of birds per hour, take that figure with a grain of salt.





You can come up with your own ballpark estimate of how many birds per hour a piece of equipment can handle by determining a) how many birds it can handle at a time and b) how long those birds will spend there before moving on to the next step of processing. For example, if a rotary scalding can fit four broilers and the scald takes 70 seconds, you could theoretically run the scalding 51 times in an hour. Multiplied by 4 birds for each cycle, that's 204 birds per hour. Of course, that's wildly optimistic, given that it doesn't account for the time it takes to move the birds in and out of the scalding and it assumes that whoever is operating the kill side will be free to swap new birds into the scalding as soon as each batch finishes. We could get a more realistic idea by tacking on 15 seconds before and after each scalding cycle, accounting for time needed to move the birds from the cones to the scalding and from the scalding to the plucker, plus some extra buffer time to account for interruptions (and there will be interruptions!). That gives us 100 seconds for each batch of 4 broilers, or 36 batches per hour. With four broilers in each batch, that scalding should be able to handle 144 birds per hour.



If you are aiming for a capacity of 400-600 birds per day, that scalding should do the trick. Barring any big interruptions, the scalding should be able to handle over 400 birds in three hours. However, you haven't figured out your facility's actual capacity until you have put together the whole workflow. If the plucker can only handle three broilers at a time, or if you only have space to bleed out three birds at a time in the kill cones, then you can really only scald three broilers at a time. Since you'd need to run the scalding for the same amount of time whether you were doing three birds or four, this difference can add up to a pretty

Process Flow with Inputs



KEY

-  Electric
-  Gas / propane
-  Water (plumbed)
-  Water (plumbed or manual)

-  Whole bird / carcass
-  Giblets / head / feet

significant dent in your efficiency. Even if we assume that you save a couple of seconds getting the birds in and out of the scald—let's say you now only need 95 seconds for each batch of 3, bumping you up to about 38 batches per hour—now the scald is only managing 114 birds per hour, 30 less than if you could scald four birds at a time.

How would you solve this bottleneck? It's simple, so long as you haven't already bought the equipment (which is why we're going over this now!): get a scald and plucker that you are sure can handle four broilers at a time, and assure that you will always be able to have four birds in the cones. You'd probably be best off having eight cones, so that after you remove the four that have finished bleeding out and start the scald, there will already be another four finishing their bleedout. While the scald is running, you can move four more birds into the empty cones.

Kill side bottlenecks mainly have to do with the equipment; after that point, equipment can still cause backups, but labor is often the more significant limiting factor. It may take anywhere from four to ten or more eviscerators to keep up with one efficient kill side operator. On the enclosed Massachusetts MPPU, two kill side operators can send four broilers to the clean side every two minutes. If the workers at the eviscerating table are averaging two minutes per bird, it would take four of them to keep up, with a fifth person to receive the birds coming out of the plucker and remove heads and feet.

If you have any experience eviscerating chickens, you may have raised your eyebrow at the notion of four people averaging two minutes per bird, considering that this assumes their only tools are probably a table, a knife, possibly a lung scraper, and nozzle or hose to rinse off the carcass. The problem isn't that you can't eviscerate a chicken in two minutes; an experienced, focused, and motivated worker probably can. The problem is that an inexperienced worker could take much longer—anywhere from five minutes to ten minutes, or even longer if the worker isn't able to proceed with confidence, isn't particularly motivated to work faster, or sees the event as more of a social gathering or strictly a learning experience. These last few issues can be addressed with a few words to your volunteers or workers before processing begins, and with a bit of light policing on the part of whoever's in charge; as for experience level, that will only come with training and time. A first-time eviscerator will probably start slowly—probably a good thing, for the sake of quality control—but might double in speed after five or six birds.

Taking all of this into account, there are a few basic ways to speed up evisceration:

Labor improvements:

- Better trained workers
- More workers (as allowed by the workspace)

Equipment and structural improvements:

- Minor equipment upgrades, e.g. better tables or shackles
- Major equipment upgrades, e.g. Vac-Air system
- Arranging work flow to maximize efficiency/make best use of labor
- Expanding or arranging the workspace to accommodate more workers

There is a giant leap—in both productivity and cost—between a standard small-scale manual evisceration setup, using tables or shackles and making the initial cut with a knife and removing viscera by hand, and advanced evisceration equipment, such as a Vac-Air system paired with shackles. Generally, quantity and quality of labor is the main determining factor in efficient eviscerating, as well as packing. In the design phase, you can help make the best use of labor by ensuring that there will be enough workspace for as many eviscerators as you think you will need, and seeing that the workflow is intuitive. This really means visualizing the movement of the whole bird, separated products (giblets, heads, feet, and possibly necks),

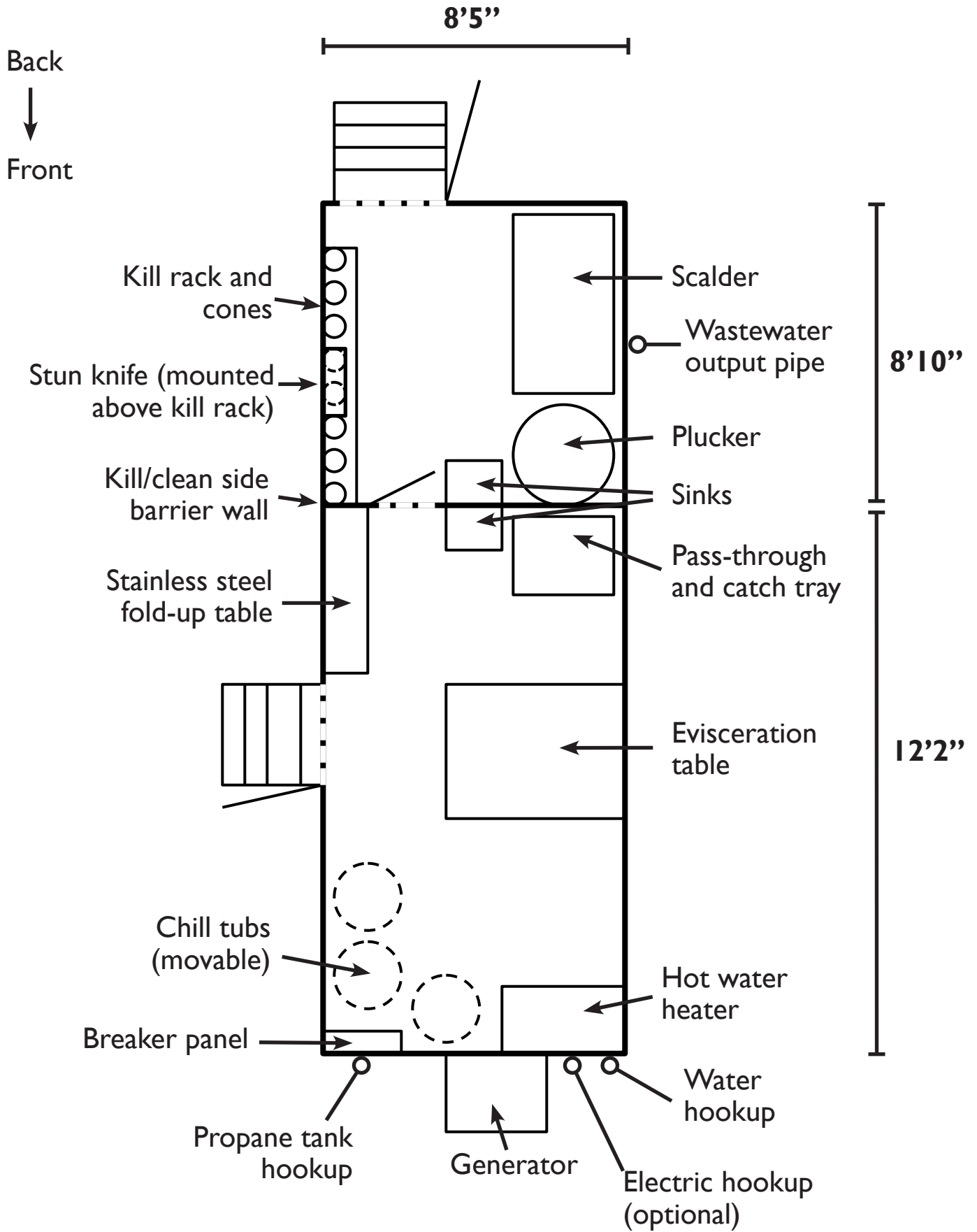
waste products, and the workers themselves.

Also be sure you allow enough space for chill tanks, and make them accessible. If regulations allow you to set up the packing station outside of the facility (e.g. alongside an MPPU rather than on the trailer itself), this is often a good idea to allow more space for workers and so that packing can begin—presuming the birds have been adequately chilled to an internal temperature of below 40 degrees Fahrenheit, which could take one to four hours. Otherwise, you can either dedicate space on the clean side to set up a packing table, or you may be able to reuse some of the eviscerating space, such as a stainless steel eviscerating table, as workspace for packing. This will mean you have to finish evisceration and thoroughly clean and sanitize contact surfaces before packing.

Due to the importance of labor quality and quantity, and to the host of potential snags waiting to slow you down on processing day, there's no precise way to figure out how many birds you'll actually be able to process per hour. It is useful, though, to come up with reasonable best and worst-case scenarios. Just remember to be conservative in your estimates and leave plenty of wiggle room; if there's one thing the various operators of the Massachusetts MPPUs have learned, it's that when processing day rolls around, there will always be something you didn't anticipate. It may be something foreseeable that you overlooked, or it could be something totally unexpected; either way, the best you can do is build a unit with the capacity to operate efficiently, prepare well for processing day, and be ready to roll with the punches.



Appendix A1: Enclosed Massachusetts MPPU



Chassis Running Gear

Tandem 8,000# Dexter Torsion Spring Axles

Standard 12" x 2" Electric Brakes w/ Breakaway Switch and Battery

8 Bolts on 6.5 B.C. Hubs, 6,000 lb. per axle Capacity

E-Z Lube Hubs

16" x 6" OEM Modular Wheels (3,750 lb. Capacity Each)

LT235/85R-16G Tires on Rims (3,750 Lb. Capacity Each)

Trailer Equipment

7-way Trailer SAE J560 ICC Lighting Receptacle

Pintle hitch receiver

Heavy Duty Front Hitch Jack (5,000 Lb) with Telescoping Leg and Sand Pad

(4) Telescoping Front and Rear Stabilizer Legs in Corner Posts

Additional Body Equipment

Two (2) Skid Plates at Rear of Frame

One (1) Curbside 36w x 80h Single Personnel Door with Camlock

One (1) Rear 36w x 80h Single Personnel Door with Camlock

Two (2) 19 x 19 Framed Roof Opening for Exhaust Fans

Seven (7) Sliding Safety Glass Tinted Windows (30"High x 36" Wide)

One (1) Aluminum Grip Strut Step Assembly with Handrails and Leveling Feet

Two (2) Roof Mount Direct Drive Exhaust Fans – 10" Diameter

Grainger Model No. 4YC86, 120VAC, Single Phase – 550 CFM

Interior Wall, Ceiling, and Floor Finish

5/32 in. Luau Plywood Interior Lining on Walls and Ceiling

.090 White Fiberglass Interior Lining over Plywood on Walls and Ceiling

All Lining Seams to be Sealed for Water Resistant during Washdown

1" Foam Insulation with Vapor Barrier in Walls and Ceiling

.100 Aluminum Tread Plate Flooring in Kill and Clean Room with formed 6" Toekick

Tapered to Center Drains with fully Welded Seams

Center Lateral Double Partition Wall with Door - Full Width and Height
with 32 w x 24 h Pass Through Opening

LP Gas Equipment

Gas Lines and Shutoffs to Service Equipment

High Volume Two Stage LP Gas Regulator

Racking for Three (3) 40 Lb. LP Gas Bottles with Rack and Pigtails

Electrical Service Equipment

Cummins/Onan 10KW Quiet Diesel Generator \$9,487
(With fuel tank, fuel guage, automatic transfer switch)

120/240 VAC / 50 Amp / 1 Phase Electrical Service

One (1) 120/240 VAC / 50 Amp Inlet Receptacle

50 ft. / 50 Amp Shore Cable

Perimeter 4 x 4 Electrical Raceway at Wall/Ceiling Transition

Six(6) 4 Ft. Vaporproof Fluorescent Ceiling Lights with W/P Wall Switches

Two (2) 120 VAC Exterior GFI Duplex Receptacles with Weatherproof Covers

Twelve (12) 120 VAC GFI Interior Duplex Receptacles with Weatherproof Covers

Two (2) 12VDC Interior & Exterior Dome Lights with Switch

Marine Deep Cycle Battery, Battery Box, and Automatic Charger

Plumbing Equipment

Stainless Steel Hand Sink Knee Pedal Operators and LP Gas Instant Water Heater

Two (2) Stainless Steel Hand Sink with Gooseneck Faucets and Knee Pedal Operators

ABS Floor Drains to Standard RV Outlet with Locking Valve

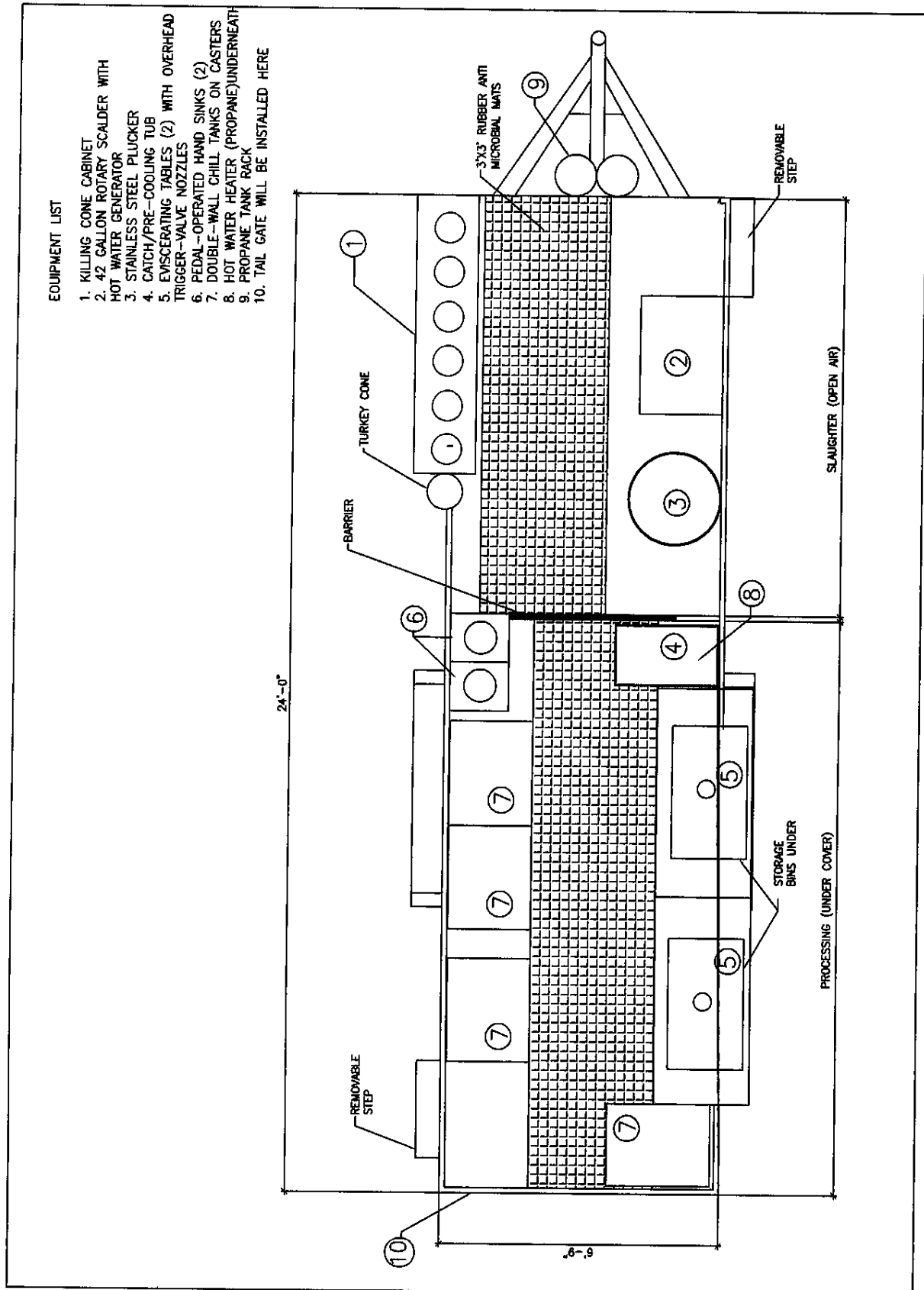
Additional equipment/supplies:

Sump pumps (1 for use, 1 as backup) @ \$180/ea \$360

Paper towel dispensers (2)

Hand soap dispensers (2)

Appendix A2: Open-air Massachusetts MPPU



Y:\2119 Small Farms Institute 2003\2119 Mobile Poultry Unit 1.dwg, 10/4/2006 1:48:45 PM, Adobe PDF

Processing equipment:

(With estimated price of purchase)

Scalder: Poultryman 30" scalder (60k BTU)	\$3,325
Plucker: Poultryman 27" plucker	\$2,275
Stun knife: Knase SKVS Electric Stunning Knife	\$2,150
Kill station: Poultryman 6-bird kill cabinet w/cones	\$1,125
Evisceration tables: Two tables w/ custom fabricated rack (With 4 hoses and trigger nozzle wands)	\$1,160+
Chill tubs: (4) Featherman chill tanks (discontinued)	\$1,846
	Subtotal: \$24,433

Trailer components and specifications:

Dimensions - 24 ft. long x 7 ft. wide

11,960 lb. GVW

CAM Superline utility trailer	\$5,600
Veranda ArmorGuard composite lumber flooring	\$420
4 Stabilizer legs	\$120
Pintle hook with receiver bar	\$85
Work area barrier (between kill and clean sides)	\$40
Optional shade and water shelter with tarp	Custom fabrication
Removable steps and crate rack	Custom fabrication
Removable waste chutes (on evisc. table, plucker)	Custom fabrication

Additional equipment/supplies:

Pedal-operated hand sinks	\$595 (NESFI)
Hot water heater (propane) (10 gallon)	\$450
Water meter and backflow preventer valve	\$369
Sump pump	\$130
Paper towel dispensers (2)	
Hand soap dispensers (2)	

Appendix A3: More Case Studies and Floor Plans

Island Grown Initiative MPPU (Martha's Vineyard, MA)

www.islandgrown.org/poultry

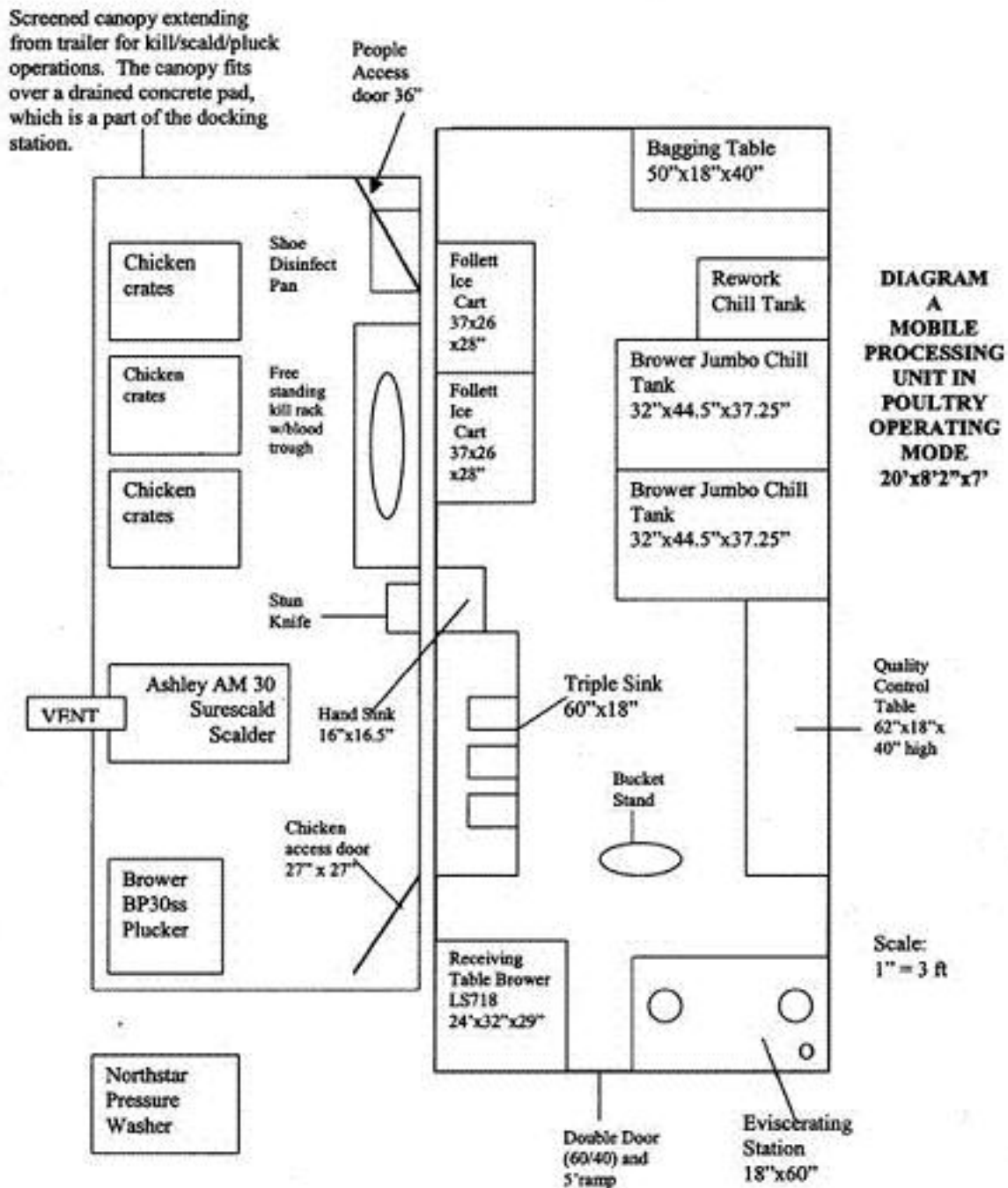
- Mobile poultry processing unit operated by Island Grown Initiative; farmers pay for on-farm processing service.
- Equipment removed from trailer, set up on wood chips at site; see Cornerstone Farm Ventures “Mini MPU” (<http://www.cornerstone-farm.com/equipment/mobile-processing-poultry-mpu-mppu/mini-mpu>)
- Construction cost: \$10-15,000



Kentucky MPPU

<http://www.extension.org/pages/16092/kentucky-mobile-poultry-processing-unit>

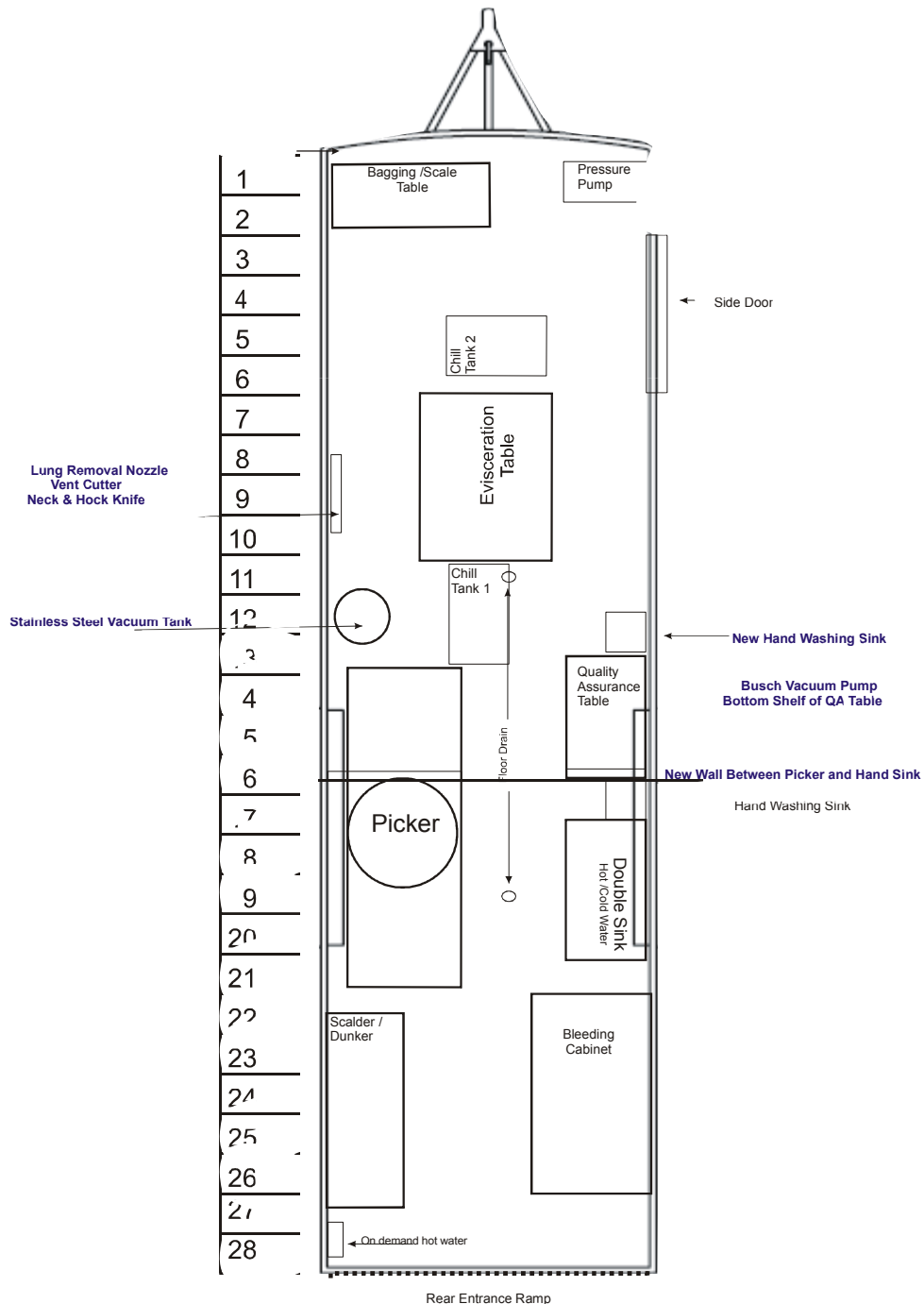
- Mobile unit with docking stations, used for both poultry and aquaculture processing; built/managed through partnership between Heifer International, Kentucky State University, and the Kentucky Department of Agriculture. "Home base" is Kentucky State University farm's docking station.
- Trailer: Enclosed, gooseneck cargo trailer, 20' L x 8' W.
- Construction cost: \$70,000



Hudson Valley Poultry Processing

<http://www.extension.org/pages/25528/hudson-valley-poultry-processing>

- Mobile poultry processing unit, privately owned and operated; farmers rent the unit and process their own birds.
- Trailer: Enclosed, re-fitted car transport trailer (Cargo Mate), 28' L x 8' W
- Construction cost: \$100,000+ (insured at \$125,000)



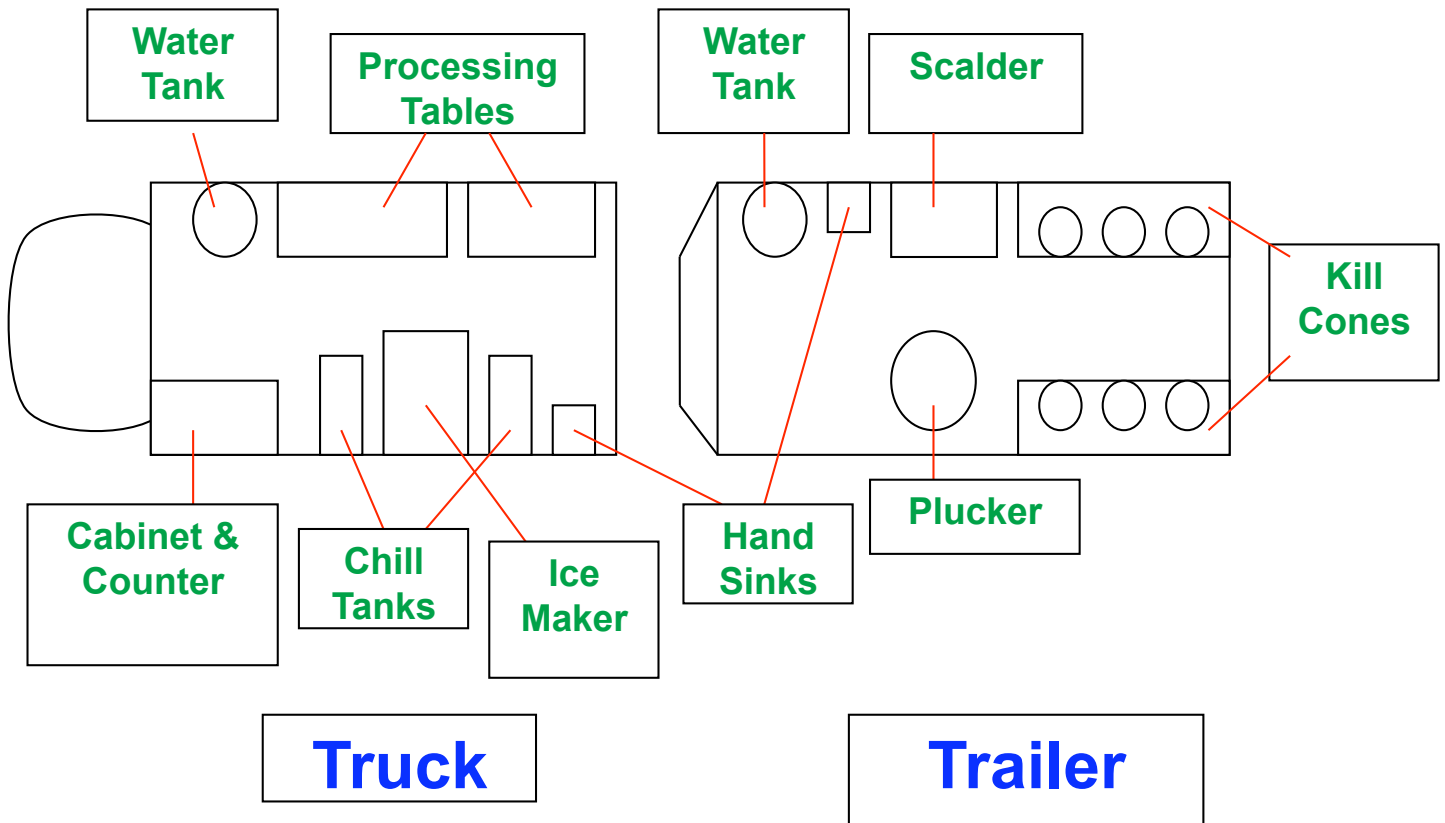
Montana Poultry Growers Cooperative

www.chicken.coop/mobile-processing-unit

www.chicken.coop/wp-content/uploads/2010/05/Poultry-Manual-web.pdf



- MPPU, rented to farmers across Western Montana
- Montana Poultry Growers Cooperative, Farms for Families, and Mission Mountain Food Enterprise Center.
- Enclosed trailer and box truck; killside on trailer, clean side on truck
- Construction costs:
 - Truck - \$18,000
 - Trailer - \$7,000
 - Equipment - \$20,000
 - Custom fabrication - \$1,000
 - Total - \$46,000**



Community Agricultural Development Center (Washington)

<http://communityagcenter.org/processing/poultry-unit>

- MPPU, rented to farmers, operates under state inspection for poultry and rabbits.
- Built by Community Agricultural Development Center in collaboration with Washington State University Stevens County Extension, with grant from state ag department.

Trailer

Interstate Cargo trailer 8'(102")x20' equipped with the following:

- 7' ceiling, insulated, walls and ceiling lined with Aluminum aluminum diamond plate floor
- partition wall @ 6' from rear, 1" off floor, with 24"x24" access door
- 36" door at right front
- 14" roof vent
- 110vac 50 amp panel with 25' utility cable
- 110v roof air conditioner, 13,500 btu.
- Fluorescent lighting: 2-4' in rear; 2-8' in front. Shatter-proof bulbs.
- 110vac GFI outlets (3).



Equipment

- Bosch tankless water heater WR400 LP
- Scalder Ashley SS-30 120V 60HZ
- Picker: Brower BP25SS batch picker
- Bleed Rack 48" with 8 killing cones (Brower): modified locally to add blood collection trough
- Triple sink, handwash sink, soap dispenser, center pull towel dispenser.
- Stainless steel work top 18x60, with drain
- Evisceration table, shackle bar and 4 shackles. Table modified for wall mount and lower level shelf and drain.
- Scale Globe BSP30 (prints name, address, product information)
- SSPWT 30x48 (portable work station)
- Strip door curtain (for rear of trailer)
- Misc: , pinning knife, boning knife, slant point knife, shears, delunger, pocket thermometer, 4 vinyl aprons.
- Pressure washer (Sears, 6hp gas model)

Modifications

- Plumbing, drains, installation of water heater, and gas connections by local shop.
- Floor drain gutter, modifications of evisceration station, fabrication of blood trough and mounting of sinks, work stations, scalder, by local fabricator.

Trailer: \$11,405

Equipment: \$12,070

Systems/Modifications: \$4,745

Total: \$28,220

Attachment C: Floor Plan

8' by 20' with 7' ceiling

Double rear doors, 36" front/side door

30" x 30" windows over evisceration and quality control tables

Electrical:

50 amp service

CFI Outlets

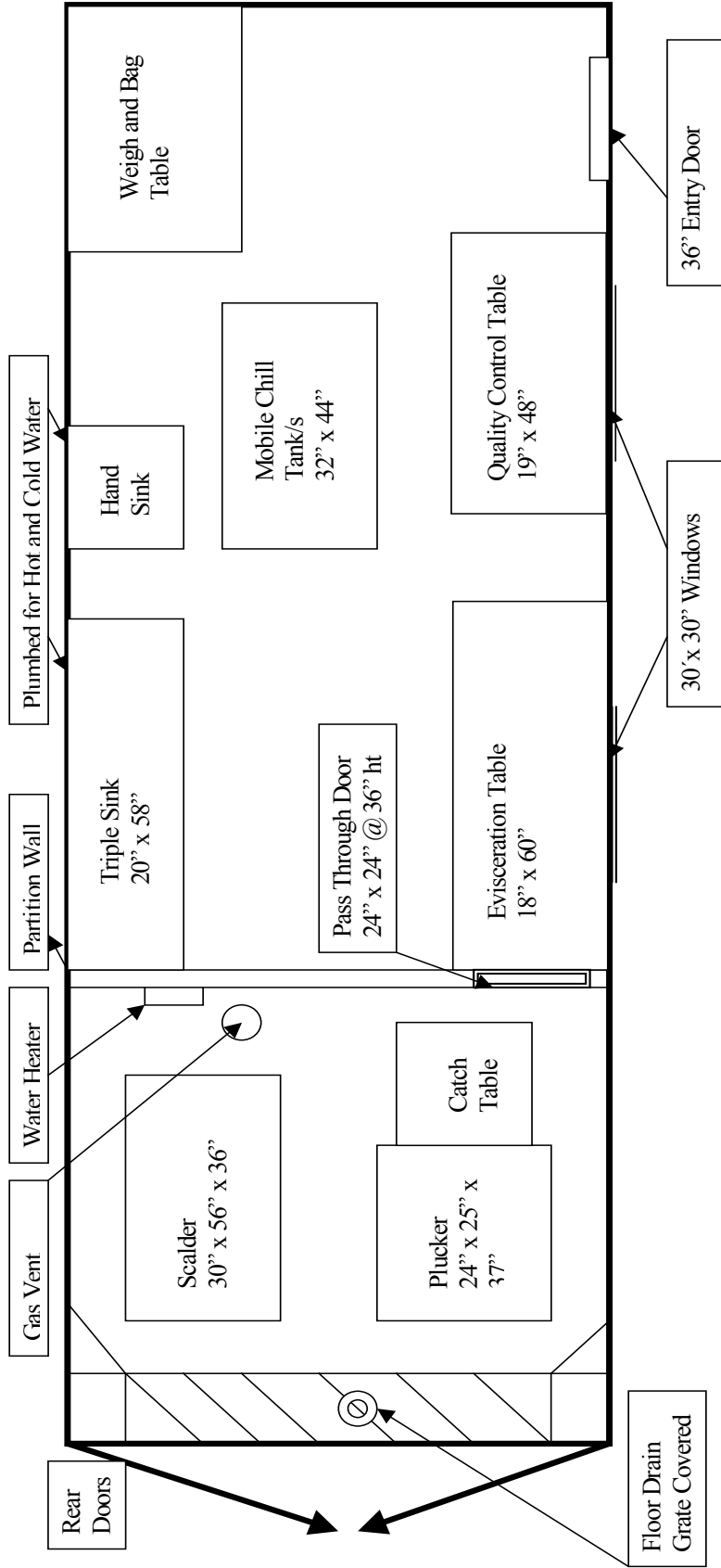
Covered Fluorescent Lighting

Plumbing:

Sinks drain to rear

Wastewater collects at rear

Tankless gas hot water heater



Appendix B: Resources

MPPU fabricators

Cornerstone Farm Ventures

Norwich, NY
www.cornerstone-farm.com
607-334-9962

Brothers Body and Equipment

Galion, OH
www.brothersbande.com
419-462-1975

Equipment manufacturers

Cornerstone Farm Ventures

www.cornerstone-farm.com

Poultryman

www.poultrymansupply.com

Ashley Machine

www.ashleymachine.com

Knase/Pickwick

www.knasecoinc.com

Brower

www.browerequip.com

Featherman

www.featherman.net

More resources

New Entry Sustainable Farming Project

Farm and Food Safety Management Guide
<http://nesfp.nutrition.tufts.edu/downloads/MPPUHandbook.pdf>

Handbook for Small-Scale Poultry Producer-Processors: How to Apply for Licensure to Process Poultry Using a Massachusetts-Inspected Mobile Poultry Processing Unit
<http://nesfp.nutrition.tufts.edu/downloads/MPPUHandbook.pdf>

Additional poultry resources:

<http://nesfp.nutrition.tufts.edu/training/poultryresources.html>

New England Small Farm Institute

As-built guide to open-air Massachusetts MPPU
http://www.smallfarm.org/main/special_projects/mppu/as_built_guide/

E-Extension / extension.org

Mobile slaughter/processing units currently in operation
<http://www.extension.org/pages/19781/mobile-slaughterprocessing-units-currently-in-operation>

Mobile Poultry Processing Units: Reports from the Field (April 2012 webinar)
<http://www.extension.org/pages/62879/mobile-poultry-processing-units:-reports-from-the-field>

Mobile Poultry Processing Units in California, Montana, and Vermont (May 2010 webinar)
<http://www.extension.org/pages/23647/mobile-poultry-processing-units-in-california-montana-and-vermont>

Other resources

Small Scale Poultry Processing. By Anne Fanatico, ATTRA (2003).

<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=235>

Mobile Processing: Appropriate Technology for Pastured Poultry Producers. By Sarah Diane Stokes, University of Montana (2006)

<http://www.growmontana.ncat.org/docs/sstokesfinal.pdf>

Pastured Poultry Profits. By Joel Salatin (1995).

<http://www.polyfacefarms.com/2011/07/25/pastured-poultry-profits/>

NCAT Sustainable Poultry website:

<http://www.sustainablepoultry.ncat.org>

More organizations

Niche Meat Processor Assistance Network (NMPAN)

<http://www.nichemeatprocessing.org/>

American Pastured Poultry Producers Association (APPPA)

<http://www.apppa.org/>

Federal regulations

(USDA Exemptions Explained - also see Appendix C)

Guidance for Determining Whether a Poultry Slaughter or Processing Operation is Exempt from Inspection Requirements of the Poultry Products Inspection Act

http://www.fsis.usda.gov/OPPDE/rdad/FSISNotices/Poultry_Slaughter_Exemption_0406.pdf

Poultry Products Inspection Act

Title 21, Food and Drugs: Chapter 10.

www.fda.gov/opacom/laws/pltryact.htm

Compliance Guideline for Controlling Salmonella and Campylobacter in Poultry. USDA/FSIS (2008).

http://www.fsis.usda.gov/PDF/Compliance_Guideline_Controlling_Salmonella_Poultry.pdf

State regulations

NMPAN Guide to State Poultry Processing Regulations

<http://www.extension.org/sites/default/files/NMPAN%20State%20Poultry%20Regs%20Report%20August2011.pdf>

For more on Massachusetts state rules, see the *Handbook for Small-Scale Poultry Producer-Processors*

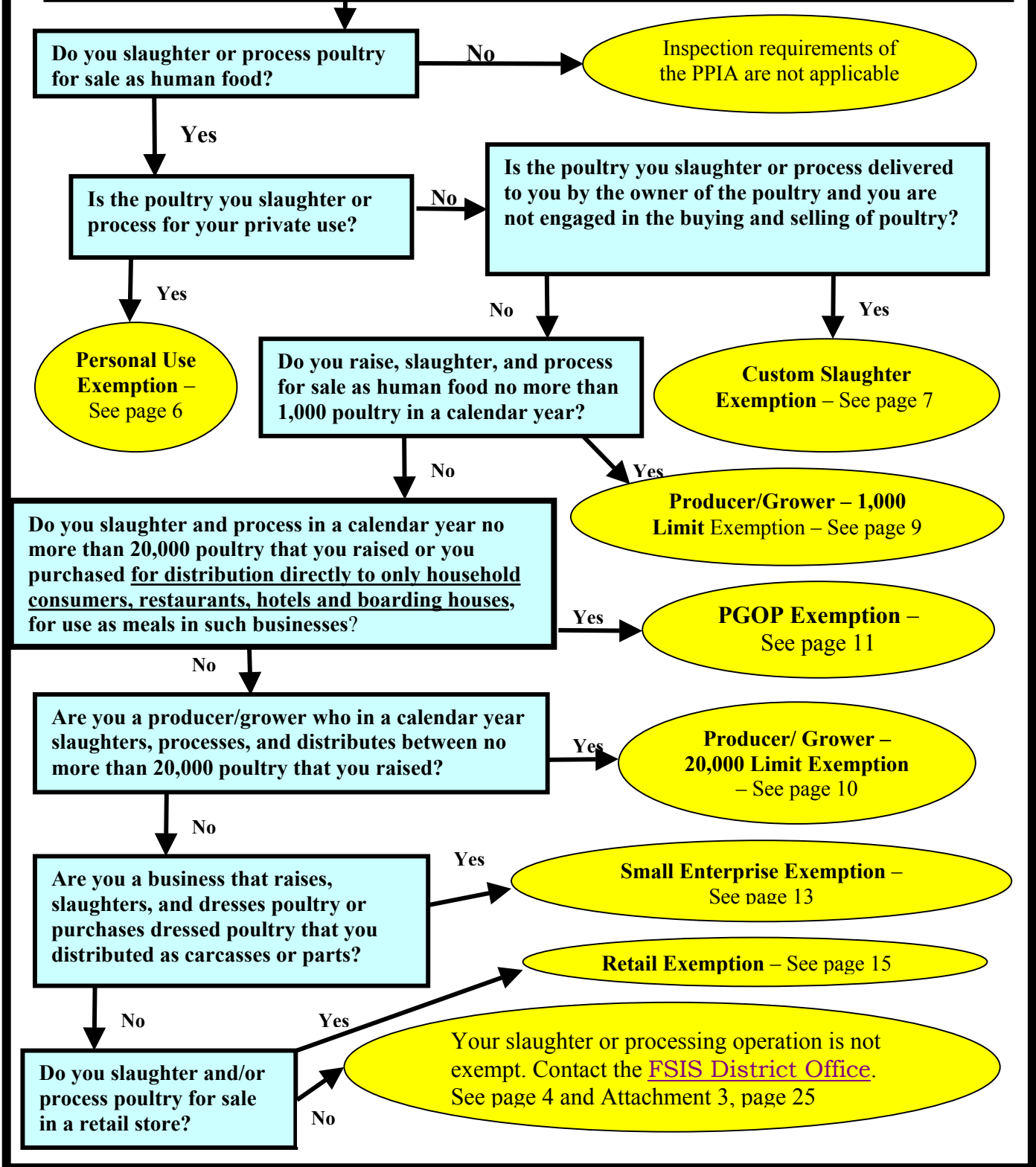
<http://nesfp.nutrition.tufts.edu/downloads/MPPUHandbook.pdf>

Appendix C: USDA Exemptions

Source: http://www.fsis.usda.gov/OPPDE/rdad/FSISNotices/Poultry_Slaughter_Exemption_0406.pdf

Figure 1 Decision Flow Chart for Poultry Exemptions Under the PPIA*

Ask yourself the question in the bold type and then follow the appropriate Yes or No response arrows to determine whether your poultry slaughter or processing operation may qualify for an exemption. You must read the criteria on the cited page before you can determine whether your operation qualifies for the exemption. (* Some States Laws May Have Different Limitations/Criteria for Exemptions than the PPIA.)



Attachment 1 B Table of Exemptions and Limitation

EXEMPTION	Customer(s) that the exempted poultry may be sold to.	Limitations: 1. on amount poultry product produced under the exemption 2. 25% or less exempt sales to HRIs 3. calendar year total sales dollar limitation 4. Identification/labeling requirements	Type of operations exempt: 1. Slaughter, 2. Processing, 3. Cut-up only.
Personal Use	Personal Use exempt poultry products may not be sold or donated for use as human food to any customer or consumer. The poultry is for the exclusive private use of the owner.	1 – No limit 2 & 3 – No sales of poultry permitted 4 – The statement "Exempt P.L. 90-492" and producer's name and address on shipping contains	1. Slaughter 2. Processing.
Custom Slaughter/ Processing	Custom Slaughtered exempt poultry products may not be sold or donated for use as human food. A custom slaughter may not engage in the business of buying or selling poultry used for human food	1 – No limit 2 & 3 – No sales permitted 4 – The statement "Exempt P.L. 90-492" and the producer's name and address on shipping containers.	1. Slaughter, 2. Processing other person's poultry.
Producer Grower 1,000 bird limit	Limited Provision of the Act apply May sell to any person, must keep records -of sales (Title 9 CFR 381.175)	1 – Yes, no more than 1,000 poultry in calendar year. Of their own raising on their own farm	1. Slaughter 2. Processing of poultry grower's raised poultry for sale to customers.
Producer Grower 20,000 bird limit	Slaughters & processes on his/her premises poultry for distribution by him/her to any person The product may only be distributed in the State, territory, or DC where it was prepared	1 – Yes, may slaughter and process no more than 20,000 poultry in calendar year of their raising on their own premises. 2 – 25% HRI limitation does not apply 3 – Dollar limitation not applicable. 4 – The statement "Exempt P.L. 90-492" and producer's name and address on product when it is distributed.	1. Slaughter & 2. Processing of poultry grower's raised poultry.
Producer Grower or Other Person (PGOP)	Slaughters & processes poultry for distribution to only household consumers, restaurants, hotels, or boarding houses. The exempt product may only be distributed in the State, territory, or District of Columbia where it is prepared.	1 – Yes, no more than 20,000 poultry in calendar year. 2 & 3 – not applicable. 4 – The statement "Exempt P.L. 90-492" and producer's name and address are required on product when it is distributed. 5 – May not slaughter or process poultry at a facility used for slaughtering or processing by another person.	1. Slaughter 2. Processing of raised or purchased (live) poultry
Small Enterprise	No restrictions on type of customer A small enterprise may not use or distribute products from, PGOP, Retail Dealer, or Retail Store exemptions The exempt product may only be distributed in the State, territory, or DC where it is prepared.	1 – Yes no more than 20,000 poultry in a calendar year. 2 & 3 -- not applicable. 4 – All the features of an official label when distributed, with the exceptions that the official inspection legend cannot be used, modification of the safe handling instructions and the nutrition facts are optional, provided, the labeling does not bear nutrition or health claims. 5 – May not slaughter or process poultry at a facility used for slaughtering or processing by another person.	1. Slaughter 3. Cut-up only
Retail Dealer	Sales limited to household consumers, hotels, or restaurants, or similar institutions. Sales to household consumers in store must be 75% of total sales. Sales to retail markets or distributors disqualify an establishment form a Retail Exemption. Product prepared from poultry previously inspected and passed by USDA permitted to cross Stateline, move in "Commerce."	1 – No limit on pounds sold to consumers. 2 – 25% HRI limitation applies 3 – Dollar limitation not applicable. 4 – All the features of an official label, with the exceptions that the official inspection legend cannot be used, modification of the safe handling instructions and the nutrition facts are optional, provided, the labeling does not bear nutrition or health claims.	1. No Slaughter. 3. Processing limited to cutting up of previously USDA Inspected and Passed Poultry
Retail Store	Sales limited to household consumers, hotels, or restaurants, or similar institutions. Sales to household consumers in store must be 75% of sales. Sales to retail markets or distributors disqualify an operation from a Retail Store exemption. Product prepared from product previously inspected and passed by USDA permitted to cross Stateline, move in "Commerce" Other, exempt product may only be distributed in the State, territory, or DC where it is prepared.	1 – Yes, there is a limit of 75 lbs. for household sales and a 150 lbs. limit for HRI sales. 2 – 25% HRI limitation does apply 3 – Dollar limitation applicable.	1. Slaughter of live poultry purchased by consumer at the retail store and processed by the retail store operator in accordance with the consumer's instructions. 2. Processing

Attachment 1. A Summary Table of Exemptions and Limitations

Summary Table of Exemptions and Limitations								
Criteria	Personal Use	Custom	Produce Grower – 1,000 Bird Limit	Producer Grower – 20,000 Bird Limit	Producer Grower or Other Person	Small Enterprise 20,000 Bird Limit	Retail Dealer	Retail Store
Slaughter Limit	NONE	NONE	YES 1,000	YES 20,000	YES 20,000	YES 20,000	Yes ZERO	NONE
Processing	YES	YES	YES	YES	YES	CUT UP ONLY	CUT UP ONLY	YES
75 lb. Sale Limit to Consumer	NO SELLING	NO SELLING	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	YES
150-lb. Limit to HRI	NO SELLING	NO SELLING	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	NO LIMIT	YES
25% of Total product/75% HRI Sale	NO SELLING	NO SELLING	NO LIMIT	NO LIMIT	NO LIMIT	N/A	YES	YES
Can Sell to any customer	NO	NO	YES	YES	NO	YES	NO	NO
Can Sell to HRI	NO	NO	YES	YES	NOT TO ALL HRIs ¹	YES	YES	YES
Sell to Distributor	NO	NO	YES	YES	YES	YES	NO	NO
Sell to Retail Store	NO	NO	YES	YES	NO	YES	NO	NO
Intra-State Distribution	NO	NO	YES	YES	YES	YES	YES	YES
Inter-State Distribution	NO	NO	NO	NO	NO	NO	YES ²	NO ²

1. Product produced under the Producer/Grower or Other Person Exemption may not be sold to institutions.

2. Only poultry products derived from federally inspected and passed poultry may be transported in interstate commerce.

Appendix D: Sample MPPU Equipment Lists and Budgets

SAMPLE FACILITY - Backyard (\$2,000 budget)

Batch size on kill side: 1 bird (any size)

For own-consumption birds only

Equipment type	Model	Cost (\$)	Notes
Killing (cones)	Traffic cones or other homemade material (1 or 2)	\$50	More difficult to clean and less durable than stainless steel cones; not up to regulations; but cheap!
Killing (rack/trough)	Homemade	\$50	Attaching the cone(s) to a wall with a trough below may be enough to catch the blood. Think about containment and cleanup.
Scalding	Turkey cooker (propane)	\$150	Scalds one bird at a time; need to manually track temperature and adjust burner accordingly
Plucking	Dux Tabletop Plucker	\$375	One bird at a time; much slower than rotary plucker for multiple birds, but much faster than hand-plucking
Evisceration	Polyethylene eviscerating table	\$99	Fits one or two workers; sanitary, but not up to code if inspection is involved; fine for home use
Chilling	(provided by farmer)		Presumably small capacity needed, so large coolers half-filled with ice water may suffice. (A refrigerator will likely be slow to bring carcasses below 40 degrees)
	Total equipment cost	\$724	
	Remaining (for trailer, labor, and miscellaneous)	\$1,276	

(presuming \$2,000 budget)

SAMPLE FACILITY - \$20,000 budget

Unit features	Very low cost, but could still potentially be state approved 3 bird batch size on kill side No frills - farmer is required to provide more (chill tanks etc.) Low power and propane draw
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Equipment type	Model	Cost (\$)	Notes
Killing (cones)	Featherman/Cornerstone stainless steel Broiler/Roaster cones (6 @ \$47/ea.)	\$282	Allows 3 birds to be "on deck" in the cones; doesn't accommodate turkeys or gamebirds
Killing (rack/trough)	Homemade	\$50	Needs to accommodate 6 cones simultaneously; could cost more or take much more time depending on your requirements (and preferences)
Scalding	Poultryman 30"	\$2,485	Up to 6 chickens; 4 broilers comfortably; 1 turkey
Plucking	Poultryman plucker (stainless, 23")	\$1,400	No turkeys; may have trouble with more than 3-4 broilers at once
Evisceration	Basic stainless steel eviscerating table (through Cornerstone)	\$395	Space limited to 2 workers; farmer may need to provide addtl. table
Chilling	(provided by farmer)		Farmer required to provide own chill tanks
	Total equipment cost	\$4,612	
	Remaining (for trailer, labor, and miscellaneous)	\$15,388	

SAMPLE FACILITY - \$40,000 budget

What it has on the \$20k facility	<p>More efficient - bigger batch size on kill side (4 birds vs. 3 birds)</p> <p>Equipped to process turkeys</p> <p>Stun knife for Animal Welfare Approved slaughter</p> <p>More workspace for evisceration</p> <p>Farmer isn't solely responsible for chill tanks</p>
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Equipment type	Model	Cost (\$)	Notes
Killing (cones)	Featherman/Cornerstone stainless steel Broiler/Roaster cones (8 @ \$47/ea.) + turkey cones (2 @ \$52)	\$480	Allows 4 birds to be "on deck" in the cones; up to 2 turkeys at once
Killing (rack/trough)	Homemade (w/ stainless steel backing and trough)	\$150	Needs to be big enough to accommodate 8 cones simultaneously
Killing (stun knife)	Knase SKVS electric stunning knife	\$1,995	
Scalding	Poultryman 30"	\$3,325	Up to 12 chickens; 6 broilers comfortably; 2 turkeys
Plucking	Poultryman plucker (stainless, 30")	\$2,275	4-6 broilers, 1-2 turkeys
Evisceration	Brower stainless steel fold-up eviscerating table (2 @ \$1,000)	\$2,000	Fits at least four eviscerators working at once, tables can be packed up afterward
Chilling	Featherman chill tub	\$350	300 gal. (200 chickens maximum); farmer required to provide chilling for any additional birds
Total equipment cost		\$10,575	
Remaining (for trailer, labor, and miscellaneous)		\$29,425	

SAMPLE FACILITY - \$60,000 budget

What it has on the \$40k facility	Upgraded scalding and plucker
	Upgraded rack for kill cones
	Additional cones for smaller birds (spent hens, guinea fowl etc.)
	Bigger and better chill tanks

Equipment type	Model	Cost (\$)	Notes
Killing (cones)	Featherman/Cornerstone stainless steel Broiler/Roaster cones (8 @ \$47/ea.) + turkey cones (2 @ \$52/ea.) + game bird cones (8 @ \$30/ea.)	\$720	Allows 4 birds to be "on deck" in the cones; equipped for turkeys, game birds, and spent laying hens
Killing (rack/trough)	Ashley wall mount and catch basin (stainless)	\$2,220	Fits 8 broiler cones in a row, with rack for extra cones; stainless steel wall and trough contain blood and make cleanup easier
Killing (stun knife)	Knase SKVS electric stunning knife	\$1,995	
Scalding	Ashley SureScald, 30" (galvanized)	\$5,170	Up to 12 chickens; 6 broilers comfortably; 2 turkeys
Plucking	Ashley SP30 (galvanized, 30")	\$6,900	4-6 broilers, 1-2 turkeys; motor next to drum (not under) for easier feather cleanup
Evisceration	Ashley four-person stainless steel table	\$2,495	Fits four eviscerators working at once
Chilling	Bonar PB30 Cooler (2 @ \$550)	\$1,100	224 gal. (about 145 chickens maximum) each - can fit close to 300 chickens; insulated
Total equipment cost		\$20,600	
Remaining (for trailer, labor, and miscellaneous)		\$39,400	

SAMPLE FACILITY - \$80,000 budget

What it has on the \$60k facility	<p>More efficient with 5 chickens per batch</p> <p>Stainless steel plucker and scalding</p> <p>Upgraded plucker with kickout door</p> <p>Additional evisceration and chill space</p>
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Equipment type	Model	Cost (\$)	Notes
Killing (cones)	Featherman/Cornerstone stainless steel Broiler/Roaster cones (10 @ \$47/ea.) + turkey cones (4 @ \$52/ea.) + game bird cones (10 @ \$30/ea.)	\$978	Allows 5 chickens or game birds or 2 turkeys to be "on deck" in the cones; equipped for turkeys, game birds, and spent laying hens
Killing (rack/trough)	Ashley wall mount and catch basin (stainless); custom fabrication to extend rack to fit 10 cones	\$2,700	Fits 10 broiler cones in a row, with rack for extra cones; stainless steel wall and trough contain blood and make cleanup easier
Killing (stun knife)	Knase SKVS electric stunning knife	\$1,995	
Scalding	Ashley SureScald, 30" (stainless)	\$7,980	Up to 12 chickens; 6 broilers comfortably; 2 turkeys; stainless steel
Plucking	Pickwick SPJ3 Picker (stainless, 30")	\$8,850	4-6 broilers, 1-2 turkeys; kickout door for easy unloading; stainless steel
Evisceration	Ashley four-person stainless steel table; Brower stainless steel fold-up eviscerating table	\$3,495	Fits six eviscerators working at once; fold-up table can be stowed if not needed
Chilling	Bonar PB30 Cooler (2 @ \$550); Plastic chill tub (4 @ \$75)	\$1,600	224 gal. (about 145 chickens maximum) each - can fit close to 300 chickens, insulated; extra chill tubs for over 100 more chickens, can be stacked if not needed
Total equipment cost		\$27,598	
Remaining (for trailer, labor, and miscellaneous)		\$52,402	

We'd like to hear your thoughts!
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For more small-scale poultry processing guides and other resources, please visit:
<http://nesfp.nutrition.tufts.edu/training/mobilepoultry.html>

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