



Chapter 6 Processing the Crops

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[Link to Chapter 06 Grown in Totnes Case Study](#)



So you want to be a miller, great! Here are a few things to consider along the way, that will help you to plan this element of your enterprise.

6.1 Post-harvest Crop Care

Ongoing care/checks (See [Chapter 5 - Care of the Crops](#))

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6.2 Which Grains do You Want to Process into What? And How?

6.2.1 The Structure of Grain

There are three parts that make up a grain - the bran, the germ and the endosperm*.

- The bran provides fibre, protein and vitamins that are vital in maintaining a healthy digestive system.
- The germ provides B vitamins and fatty acids that are necessary for healthy brain function.
- The endosperm contains starches, carbohydrates, protein, iron and B vitamins.

This link shows the structure of different grains and the difference in their composition.
[Structure of cereal grains and legumes](#)

6.2.2 The Different Processes Required for Your Products

(Polish - P; Mill - M; Sieve - S, F - Flake)

(See [GinT Case Study 3.2 - Processing Equipment](#) - for details of how to use the different machines for different products)

Wheat, Einkorn or spelt

- Wheat groats/berries (P)
- Flour - wholemeal or white (P, M, S)
- Flour for making pasta (P, M, S)
- Bran (P, M, S)
- Wheat flakes (P, F)
- Semolina* (P, M, S)

Barley

- Barley groats (P)
- Flour - wholemeal or white (P, M, S)
- Barley flakes (P, F)

Rye

- Rye groats (P)
- Flour - wholemeal or white (P, M, S)
- Rye flakes (P, F)

Oats

- Oat groats (P)
- Oat flour (P, M, S)
- Oatmeal (P, M, S)
- Oat bran (P, M, S)
- Oat flakes (jumbo style or porridge) (P, F)

Peas and Pulses

- Dried whole (P)
- Flour (P, M)

Brewing

- Beer - Here is a list [of useful brewing books by ex-head brewer Ian Hornsey](#)
- Spirits

6.2.3 Specific Processing Information¹

6.2.3.1 Polishing

No matter what product you are producing the crop will need careful cleaning (and ideally polishing) to remove dust and any insects before you undertake any other process.

6.2.3.2 Flaking Wheat

- Because wheat is much lower in oil than oats they need to be dampened before rolling, otherwise they are too brittle and will break up. After polishing add c. 3-5% water evenly to the grain, and let it soak in overnight before flaking

- Hard modern wheat will crack more easily if not tempered* sufficiently

- Once rolled you will have to dry them a little to bring the moisture back down to 14% or less, in order that the flakes don't go off

6.2.3.3 Roller Milling

Roller mills are used in industrial flour production. In the roller-milling process the cereal is broken up into its constituent parts and then recombined to make the flour required via a series of extractions, the germ is removed, resulting in important minerals, fats, fibre and vitamins being eliminated. After the second world war the UK government required white wheat flour to be fortified with the vitamins and minerals that had been lost. Calcium carbonate, iron, thiamine/Vitamin B1 and Nicotinic acid are added. There is considerable research to show that these synthetically produced nutrients are less bioavailable to the human body than those found naturally occurring in wholemeal stoneground flour.

¹ With thanks to John Letts for his advice

Eliminating the fatty, nutritious part of the grain will reduce the rate of rancidity and so roller milled flour will keep for longer. Roller milling may also make flour more indigestible, than traditional stoneground. This coupled with high speed industrial baking methods (as opposed to the long slow fermentation of the sourdough process) and the accompanying necessarily higher gluten flours, imported from countries such as Canada and Uzbekistan, are the principle causes for the rise in gluten intolerance.

6.2.3.4 Stone Milling*

Compared to roller milling stoneground flour is milled in a cool and gentle way; as a result stoneground wholemeal flour retains all of the vitamins and minerals of the whole grain. White stone ground flour contains less nutrients than the wholemeal equivalent and exact levels will vary with different extraction rates, but the endosperm and its nutrients are retained in the flour.

6.2.3.5 Types of Wheat Flour

6.2.3.5.1 Pasta flour

- is usually made from high protein durum or common bread wheat grown in hot climates. Durum wheat* does not grow well in the UK, but fresh pasta can be made from any strong flour.

6.2.3.5.2 Semolina*

- is usually made from the hard, starchy endosperm* of durum wheat, but a little semolina is produced whenever wheat grain is milled into white flour

6.2.4 Challenges

- Know the number of processes that each product needs to go through as this will affect the cost of the end product and the ease of doing those processes, e.g a grain that requires dehulling requires more time and equipment input than one that doesn't

- If processing oats you will need to consider how to overcome rancidity issues associated with the high fat content of this grain

- Consider how to make your processing time efficient by considering what processes can happen at the same time. E.g you can polish at the same time as milling and sieving once you have got a flow of grains moving between the pieces of equipment (See [GinT Case Study - 3.3.2 Layout of Processing Premises](#))

- There is a balance to play between the speed of output from the mill and the quality of your flour. Essentially the slower the output the cooler the process and the less damage to the nutritional composition of your flour (See [GinT Case Study - 6.3 & 6.4 Using and Caring for Your Processing Equipment](#) - Milling section)

6.2.5 Bags and Bagging

Ensure that you have all of the equipment needed to undertake bagging such as:

- Calibrated scales
Trading Standards require scales to be verified for trade use, [details on how to check this can be found here](#). They are also required to be accurate and this can be proved by purchasing M1 accuracy calibrated weights at all the relevant packing weights you will be using. Purchase them with a calibration certificate. Best practice would be a UKAS certificate as this is calibrated by a lab that meets national standards and is regularly audited ([visit here for an example lab](#)). However the legal requirement is that they are accurate to M1 level and there are cheaper, non UKAS labs who can do this work.

The weights will need recalibration at regular intervals depending on how much use they get, either yearly or 2 yearly would be best practice initially and then assess the timescale for future calibration.

If your scale interval is 5g then the scale reading should be within one division of the weight (e.g. for 500g you can have 495g or 505g but not 490g or 510g); if the reading is outside of this then the scale will need recalibration. If your scale interval is 2g then you will be allowed 1 division error up to 1kg and 2 divisions error over 2kg. Scale repairers can be found by an online search

- A table of suitable height and size, ideally stainless steel

- Trugs

- Flour scoops

- Appropriately sized bags

- Labels

- Tape

Consider the purpose of your bags before choosing and designing them:

- Ensure that the bags and the printing on them are in alignment with the ethics of your enterprise (compostable packaging, vegetable dyed printing, compostable tape and labels etc) (See [GinT Case Study 8.3.4 - Packaging Design](#))

- Ensure that the packaging makes your product distinguishable on the shop shelf and tells your story (See [GinT Case Study 8.3.4 - Packaging Design](#))

* Denotes items featured in the [Glossary - Chapter 11](#)

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6.3 Using Your Processing Equipment

(See [GinT Case Study 3.2 - Processing Equipment](#))

6.3.1 How Much Can be Processed in a Day?

This will depend on the make and model of your equipment, this information should be available in the equipment manual, alternatively contact the manufacturer

6.3.1.1 Other Factors to Consider

Remember to take into account how much time the following additional elements of the process take:

- Manoeuvring goods around

- Tempering grain

- The different processes being undertaken in a day

- Bagging

- Record Keeping

- Breaks

- Informing and training staff/volunteers on the day's activities

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6.4 Caring for Your Processing Equipment

Regular maintenance/cleaning

- Identify the frequency required

- Keep a record sheet of maintenance/cleaning

- Ensure you have the tools you need

Irregular maintenance

- Identify the frequency required

- Keep a record sheet of maintenance/cleaning

- Ensure you have the tools you need

Other things you may wish to record

- Hours of use of equipment

- Issues and Shortfalls

- Where the equipment manuals are kept - make this known to key staff

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6.5 The Paper Trail - Stock Movement, H&S and Food Hygiene

As a food enterprise there is a need for clear, accountable systems to be in place to ensure that you have minimised risk to your workers and to your consumers, and that you have a fully traceable paper trail from the farm to your consumers. The two key documents are your risk assessment and your HACCP. The Risk Assessment focuses on risks posed to staff and volunteers and their safety during work. The HACCP is all about reducing and preventing risks to food safety of the end product.

6.5.1 Health & Safety Docs

- Carry out a risk assessment within each of the key areas of potential

operational risk to identify:

- The specific risk
- Who is at risk
- The precautions that have been taken
- The level of risk after precautions have been carried out

The list below isn't exhaustive and will vary depend on your circumstances but are likely to include the following:

- Lifting

- Allergens

- Slips and trips

- Falling from a height

- Injuries and entanglement by machines

- Dust inhalation

- Noise

- Electric shocks

- Burns

- Traffic accidents

- Provide a staff induction pack to ensure that your staff, volunteers, visitors etc are given all of the information that they need to keep themselves safe and aware of hazards. The list below isn't exhaustive and will vary depending on your circumstances but is likely to include the following:

- Useful general contact information

- Emergency contact information

- Details of where the fire extinguishers are located

- Details of where the first aid kit is kept

- What to do in an emergency

- What to expect as a volunteer/worker etc e.g an outline of a typical day in the processing unit and expectations on both sides

- Mould, e.g pink colouring on the grain

- Hygiene, Health and Safety

- Organising the unit, record keeping and communications

- How to take product orders

- Receiving grain deliveries

- Record keeping

- Process for orders

6.5.2 HACCP (Hazard Analysis and Critical Control Point)

HACCP is a way of managing food safety hazards to keep your food safe from biological, chemical and physical food safety hazards throughout the food chain. A food hazard is something that could make food unsafe or unfit to eat. It is important to identify those stages in your business when hazards could be present so they can be removed or reduced to safe levels. [MyHACCP](#) is a free web tool that will guide you

through the process of developing a food safety management plan based on the HACCP principles.

To make a plan you must:

- Identify any hazards that must be avoided, removed or reduced

- Identify the critical control points (CCPs) - the points at which you need to prevent, remove or reduce a hazard in your work process

- Set limits for the CCPs

- Make sure you monitor the CCPs

- Put things right if there is a problem with a CCP

- Put checks in place to make sure your plan is working

- Keep records

- Create a flowchart to show all of the processes and stages that the HACCP applies to e.g from farm to store, to processing unit, to retail outlet

- Crop testing for diseases from the field

- Stock movement records/crop intake passport

- Moisture testing Records

- Contamination/quality checks

- Stock/batch records

- End of the day routine/cleaning, checks and records made

- Recall procedure

6.5.3 Organic Certification

Under UK law, any company processing, packing or selling organic food, animal feed or seeds, or importing these from outside the EU, must have their systems inspected and certified by a DEFRA-approved organic control body. For information on what you need to do to achieve organic certification visit [OF&G's website here](#).

Note that certification applies not only to the growing of your crops and your processing unit but also where you store your crops if this is in a different place.

The cost of certification can prohibit small scale processors. An alternative is to use the Wholesome Food Association mark which is designed on a basis of trust built up between producers and their consumers. There isn't any inspection, just a set of guidelines that you are expected to adhere to. For more information see the [Wholesome Food Association's](#) site.

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6.6 People - Staff, Interns and Volunteers

Your team may be a combination of paid staff, volunteers, interns and trustees and it is important to consider both what you are offering to them and to communicate your expectations to them. There are a number of documents that can help in this process, some aspects will fall under your H&S policy and others will be voluntary. Giving time to this helps you focus on the culture that you are wanting to create within your enterprise. Consider:

- Your offer to the different people involved in your enterprise

- What do you need from the different people involved in your enterprise

- What opportunities are you offering to enable people's involvement in certain activities

- How accessible you can make your operations to as wide a range of people as possible

- Training opportunities, skill sharing processing, bagging, moving etc

- Mechanisms for information sharing, daily task planning, project planning; such as regular team meetings, meetings at the beginning of a processing day to discuss activities etc

- Volunteer policy (See GinT Case Study for details of what to include)

- Safety/insurance etc

- How will you recruit the different types of people you need for your project including advisors?

- Local networks
- National networks
- Email lists
- Newsletters
- Personal contacts
- Sign up sheets at local events

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