

## It's All Edible: Four Views of Offal

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After walking up the north side of Pacific Street from Grant Avenue and ushering my charges, first across Stockton Street, and then, turning left, to the south side of Pacific Street, I took a long deep breath and gathered everyone on the corner. For the next three blocks, my group of about twelve tourists would be pressing their way down the most heavily packed sidewalk on the busiest day of the week at the worst time of the day in the most densely populated district of San Francisco.<sup>1</sup> These three blocks on the west side of Stockton Street in the late-1970s were chock-a-block with fishmongers, butchers, vegetable vendors, bakeries, and restaurants. The street was wall-to-wall shoppers, any gawking tourists hindered the locals' efficient shopping.

Saturdays also meant that a worn pick-up truck stacked twelve-feet high with cages would be parked in the first block selling live poultry. Where there was space between the open store fronts, the occasional unlicensed vendor would set up a small table to sell one or two vegetables or some small item from China.

The foot traffic tacked mostly from north to south, but it was possible to walk upstream if you stayed close to the curb or walked in the street. Periodically, a truck would park along the curb, blocking those impatient folks walking in the street. The delivery man would make a pile of boxes on the sidewalk near the curb. Then, the driver would steer a box-loaded hand truck through the stream of bodies. This temporary annoyance did little to stem the flow of shoppers, each one intent on completing the task at hand.

Before I let my group enjoin the battle, I instructed them to go at their own pace and walk no further than the corner of Clay Street, three blocks distant. By the time I had moved to the second or third store, as was typical, only four or so people stayed within listening distance. When we stopped in front of a grocery store, I discussed the vegetable varieties that were unfamiliar from their personal shopping. In front of a bakery, I chatted about the differences between steamed or deep-fried versus baked pastries. At a fish store, I identified the various live species including the frogs and turtles. In front of the butcher shops, I pointed out the pig and chicken feet and the whole chickens and ducks with their heads still attached to their bodies.

No matter what my group observed in the fresh-food stores, it was always the hotel pans of cooked food in the restaurant windows that raised the most eyebrows, and maybe, turned a few stomachs. Along with the cooked-vegetable and meat dishes common to each restaurant and the roast ducks, roast chickens, roast pork, and roast ribs hanging in the

## It's All Edible: Four Views of Offal

window, there would be pans with cooked pig's ear, pig's snout, pig's intestines, chicken feet, and duck's tongues. These were the standard items. Certain restaurants would sometimes feature roast pig's kidneys or chicken livers. As I described each item and discussed the concept of eating a food for its texture rather than taste, some of my group drew closer to learn more while others drifted away. For many, it was their first contact with offal, although I rarely used the term since few of my charges knew what it meant.

### Terminology

Prior to the rise of nose-to-tail dining in the United States and Britain, the average diner didn't think of offal, or at least the word. Sometimes you'd hear the terms 'organ meats' or 'variety meats', but it was more common to hear a portion of meat referred to by a specific name, whether its true morphologic name, like 'liver', or market name, like 'sweetbreads'.<sup>2</sup> In random questioning of people I meet, I find that most older people have a concept of offal that falls into either the 'organ camp' or the 'guts camp', and that most younger people have no concept of offal since they claim to have never heard the term.

I've been in many cooking classes in the last fifty years where an instructor has informed the class that the term 'offal' is derived from the two words 'fall' and 'off' indicating that these were the parts of the animal that fell to the ground during the dressing of the carcass. This concept is even used in the etymology portion of many online dictionaries.<sup>3</sup> Anyone who has ever witnessed a hot carcass from a recently slaughtered animal being dressed can attest to the fact that nothing in the pleural cavity, primarily the heart and lungs, falls off because everything is captured by the combination of the ribcage and the diaphragm. A similar effect is true for the digestive system which is attached at both the oesophagus and anus along with various collagenous attachments to the wall of the peritoneal cavity. There may be some bulging of the intestines or the stomach, but these will not fall to the ground until they are detached. Thus the concept of 'falling off' may make for interesting imagery but is strictly fantasy.<sup>4</sup>

The goal of this paper is to clarify one of the principal meanings of offal: 'The edible parts collectively which are cut off in preparing the carcass of an animal for food'.<sup>5</sup> The definition continues to read: 'In early use applied mainly to the entrails; later extended to include the head, tail, and internal organs such as the heart, liver, etc.' In this discussion, I propose modifying the definition to include all parts of an animal which do not consist primarily of skeletal muscle and are used raw or minimally processed as an ingredient of a prepared product. This is essentially saying the same as 'the edible parts collectively which are cut off in preparing the carcass of an animal for food', but since most people are unaware of what parts are harvested during the dressing of a carcass, some clarification is helpful. Also, not all carcasses are dressed by every producer the same way. The list of items removed during dressing will vary, and some offal, such as tendons, can only be harvested

## It's All Edible: Four Views of Offal

from a dressed carcass. Checking the list below, there are some items like tongue, skirt, and cheek that are primarily skeletal meat, but are still considered offal because they are not part of a dressed carcass.

I suggest that 'offal' only applies to raw or minimally processed food items. Thus back fat is offal. When it is rendered as lard it may still be, but when cured to make it ceases being offal. Beef tripe is offal because it is one of the four chambers of the stomach that has been minimally processed and will be used as an ingredient in a completed dish. It will not be eaten as it is provided by a butcher without further processing.

The implies, in its third edition, with the statement, 'edible parts collectively which are cut off', that offal is a collective noun. It may be better to describe 'offal' as a mass noun.<sup>6</sup> Thus we can refer to offal as being either singular or plural in English, but we cannot use the word with a count term proceeding it.

Looking at the frequency of usage in Google's Ngram Viewer, the noun form of 'offal', in all meanings, peaks around 1865 with a frequency of about one in 1.2 million words and has one nadir since then in 1985 with a frequency of about one in 4 million words.<sup>7</sup> In the 120 years between the peak and the nadir, usage of the term was reduced by about seventy percent. Unfortunately, this data lacks the granularity to give an idea of how common it is to find offal referred to in food related books.

There are also probably regional differences in the use of the word offal that we need to account for when looking at frequency. In the nineteenth century, John Farmer wrote:

Offal.—This term is far more colloquial in Western America than in England. It is applied to the same parts of the carcasses of animals ; but whereas in England no one would think of speaking of calf's heart, pig's fry, sheep's kidneys, etc., as dishes of in the States such phraseology is not unusual.<sup>8</sup>

Even though Farmer observed this more than a century ago, I think those regional differences still exist.

Up until now, I have made no distinction made between offal in different species of animals. For the remainder of this paper, only offal from the domesticated bovine, porcine, ovine, and caprine models will be considered. Although poultry, game, and seafood have harvestable, edible offal, they will not be part of this discussion.

### Identification

Any list of the specific items referred to as offal will have issues. Completeness is the first potential problem. Is there any single item missing? Fabrication is another potential problem. The United Nations' differentiates between four different ways of fabricating a tongue and provides a specification for certain muscles that may be removed in certain fabrications.<sup>9</sup> Other lists are not that specific. Animal age can be a problem since some offal

# It's All Edible: Four Views of Offal

is only harvestable during certain periods of an animal's life. The animal's sex can be an issue due to differences in genitalia. Parts that are harvestable on one species may not exist or be edible on a different species.

There are many categorization systems that can be used to make edible offal easier to comprehend. The following list follows the functional systems of the four mammals being discussed in this paper.<sup>10</sup> The specific items in the list are derived primarily from the UN the most complete listing currently available.<sup>11</sup>

## Nervous System

**Brain** Provided whole (including the cerebellum, the lobes, the thalamus and the annular protuberance) or peeled (meninges removed) except for a porcine brain where it is only provided whole. Sales of brains are limited in some countries based on species and age and prohibited in others.

## Vascular System

**Heart** Provided whole with the blood vessels trimmed close to the body of the organ. The ossa cordis is removed on a bovine heart. Buyer must specify if auricles, aorta, and pulmonary truncus are removed; fat cover retained or removed at the base; or heart left untrimmed. May be provided as part of the pluck, consisting of the liver, heart, lungs, trachea, and a portion of the diaphragm, and sometimes with the thick skirt, spleen, and thymus gland attached (not bovine), or just combined with the lungs.

4 **Spleen** Provided with the splenic blood vessels removed. In ruminants, the spleen is attached to the rumen and all connecting tissue must be removed. The spleen is not saleable for human consumption in some countries.

## Digestive System

**Tongue** Long cut: The tongue with its root, most of the hyoid bones, larynx, epiglottis, and first three rings of trachea still attached. Buyer must specify approximate fat depth retained and if the lymph and salivary glands are present. Bovine tongues require a colour (white, black, or spotted) specification. The long cut is not saleable in all countries.

Short cut: Similar to the long cut without the larynx, epiglottis, and trachea. Buyer must specify approximate fat depth retained and if the lymph and salivary glands are present. Bovine tongues require a colour (white, black, or spotted) specification.

Swiss cut: What remains after all of the hyoid bones and most of the attached fat have been removed from a short cut. The muscular part of the root and the base are removed. This cut consists solely of the body of the muscle. Bovine tongues require a colour (white, black, or spotted) specification.

Root trim: Produced from the meat trimmed when producing a short cut. Sometimes referred to as throat trimmings (bovine and porcine only).

Root fillet: Derived from the tongue root by removing the muscles from each side (bovine only).

# It's All Edible: Four Views of Offal

Salivary gland	The whole parotid gland provided with the interior lining of the cheek attached (bovine and porcine only).
Oesophagus	Provided as a whole tube from the pharynx to the bovine rumen or porcine stomach. Also available as weasand, the fleshy part around the oesophagus (bovine only).
Stomach	In ruminants, the stomach consists of four compartments or chambers named the rumen (paunch), reticulum (honeycomb), omasum (book, bible) and abomasum (reed). Each part is also referred to as tripe.
	Rumen: Provided raw and washed with the dark membrane retained, and the external surface trimmed free of fat deposits. May be supplied with the reticulum removed or attached, the dark inner layer removed, and blanched and bleached.
	Rumen pillars: Sometimes called mountain-chain tripe. Removed as one piece from rumen and supplied raw (bovine only).
	Reticulum: Provided raw and washed. May be supplied split or in its natural shape and blanched and bleached (bovine only).
	Omasum: Provided raw and washed. May be supplied blanched and bleached (bovine only).
	Abomasum: Provided raw and washed (bovine only).
	The non-ruminant stomach is similar to the abomasum.
Liver	Stomach: Provided washed only. May be supplied inside out, cleaned, trimmed, and scalded. May also be supplied bleached and stiffened (porcine only).
	Stomach lining: Provided washed only (porcine only).
	Stomach: Provided washed only. May be supplied inside out, cleaned, trimmed, and scalded. May also be supplied bleached and stiffened (porcine only).
Liver	Provided whole including the Spiegel lobe and the capsule. May be supplied with the lymph nodes retained or removed, vena cava removed, and ligament removed. Colour may be specified and the liver supplied peeled (bovine only).
Pancreas	Provided as the whole gland. Sometimes sold, incorrectly, as sweetbreads (porcine only).
Intestines	Provided as the whole tube that extends between the duodenum, the exit of the stomach, and the anus. The intestines, or parts of the intestines, are not saleable for human consumption in some countries. The intestines may be supplied in parts (see following), with the fat removed or retained, by length, and with the mucous membrane (lining) removed.
	Small intestine: Extends from the duodenum to the ileum. May be supplied with the fat removed or retained, by length, and with the mucous membrane removed.
	Large intestine: Extends from the ileum to the rectum and includes the colon and caecum (sometimes referred to as the bung). May be sold whole with the rectum attached or as individual sections. May be supplied with the fat removed or retained and with the mucous membrane removed (bovine, ovine, and caprine).

## It's All Edible: Four Views of Offal

**Intestines (continued)** Large intestine: Extends from the ileum to the rectum and includes the colon and caecum. May be sold intact or in pieces representing the caecum, upper colon, and the robe, referring to the dorsal-lumbar part of the colon (porcine only). Sometimes referred to as the chitterling.

Rectum: The termination of the intestines, ends with the anus (bovine and porcine only). Sometimes referred to as the bung (porcine only). Anus may be sold separately.

### Respiratory System

**Lung** Provided as the whole organ. May be supplied with the trachea removed, lobes separated, or just the diaphragmatic lobe only. Colour may be specified (bovine only). May be supplied as part of the pluck, consisting of the liver, heart, lungs, trachea, and a portion of the diaphragm, and sometimes with the thick skirt, spleen, and thymus attached (not bovine), or just combined with the heart. The lungs are not saleable for human consumption in some countries.

**Trachea** Provided as a whole tube from the base of the larynx to the lungs.

### Uro-Genital System

**Kidney** Provided as the whole organ with the blood vessels, urethra, and capsule removed. May be provided with external fat retained or removed, and with renal hilus and internal fat retained or removed.

**Testis** Provided as the whole gland. May be provided with the capsule intact or removed.

6 **Penis** Also called a pizzel. Provided as the whole organ with the skin removed. The penis may be provided with the root attachment material retained or removed and the tip retained or removed (bovine only).

**Mammary glands** Also called the udders. Provided as the whole glands. The mammary glands may be provided with the fat retained or removed, and raw or cooked (bovine only).

**Bladder** Provided as the whole organ (porcine only).

**Uterus** Provided as the whole organ (porcine only).

**Ovary** Provided as the whole gland (porcine only).

### Skin and Membranes

**Skin** Provided as large sheets of skin with essentially no fat attached (porcine only).

**Mask** Provided as single piece of skin removed from the skull (porcine only).

**Ears** Provided as the entire pinna with the auricular cartilage and muscle attached and hair removed (bovine only). Provided whole or cut square.

**Snout** Provided as the skin around the nose with or without the nasal cartilage attached (porcine only).

**Lips** Provided as the skin around the mouth (porcine only).

**Membrane** Miscellaneous sheaths of connective tissue stripped from muscle cuts during the butchering process (bovine only).

# It's All Edible: Four Views of Offal

## Muscles and Fat

Diaphragm	<p>Whole diaphragm: Includes the peripheral muscle, called the skirt (porcine only). Provided with fat and connective tissue retained or removed.</p> <p>Thick (outside) skirt: Connects the diaphragm to the plate (porcine only, provided as standard meat cut in the bovine model). Provided with or without the connective tissue.</p> <p>Thin (inside) skirt: Connects the diaphragm to the plate and the flank (porcine only, provided as standard meat cut in the bovine model). Provided with or without the connective tissue.</p> <p>Diaphragm membrane: The fascia covering of the diaphragm. May include small amounts of red meat (bovine only).</p> <p>Skirt sinew: The connective tissue removed from the skirt meat. May include small amounts of muscle and fat (bovine and porcine only).</p> <p>Skirt membrane: The peritoneal lining attached to the thick skirt. May include small amounts of muscle and fat (bovine only).</p>
Caul fat	Provided as sheets of transparent membrane with a netting of fat (porcine only).
Clear plate	Provided as a layer of fat from the loin section of the carcass, with or without skin attached, commonly called back fat (porcine only).
Abdominal fat	Provided as uneven sheets of fat (bovine and porcine only). Sometimes referred to as leaf fat. Also referred to as suet (bovine only).
Flank fat	Provided as uneven sheets of fat (bovine and porcine only).
Mesentery	Provided whole or in large pieces (porcine only).
Marrow bones	Provided as sawn shaft sections of the femur and humerus bones containing the marrow, which is primarily fat in mature animals (bovine and porcine only).

## Miscellaneous

Head	<p>Provided as the whole head detached between the occipital joint and the first cervical vertebrae. In ruminants, the hide is removed.</p> <p>Cheek: The muscle that covers the external portions of the upper and lower jaws, extending between the lips and the parotid gland, which may or may not be attached. May be provided with the papillae removed (bovine only).</p> <p>Papillae: Provided as a separate item from cheek (bovine only).</p> <p>Cheek meat: Provided as just the musculature of the cheek with no portions of lymph nodes, glands, or connective tissue (bovine only).</p> <p>Head meat: General classification for all musculature trimmed from the head with no portions of lymph nodes, glands, or connective tissue and no trim pieces derived from the tongue or the neck (bovine, ovine only).</p> <p>Temple muscles: Provided with skin removed (porcine only).</p>
Neck bones	Provided as the seven cervical vertebrae and attached meat remaining after trimming. May have up to four thoracic vertebrae and rib heads attached (porcine only).

## It's All Edible: Four Views of Offal

Foot	<p>Foot: Provided separated through the long pastern bone, skinned or scalded and plucked. May be provided sawn or not (bovine only).</p> <p>Fore foot (trotter): Provided separated from the fore leg at the carpal joint, with the skin either intact or removed (porcine only).</p> <p>Hind foot (hind trotter): Provided separated from the hind leg at the tarsal joint, with the skin either intact or removed (porcine only).</p>
Tail	<p>The bovine tail is separated from carcass between the sacral and coccygeal vertebrae. Provided with excess fat cover trimmed and as a specific number of vertebrae.</p> <p>The porcine tail is separated from the carcass between the second and third coccygeal vertebrae and trimmed of excess fat and skin near the transection. Provided with coccygeal cartilage and connective tissue trimmed or retained.</p>
Tendons	<p>Provided as any of the superficial and deep tendons and surrounding tissue of the hind legs (bovine, ovine, and caprine only).</p> <p>Provided as the superficial and deep flexor tendons and surrounding tissue of the fore legs (bovine only).</p> <p>Provided as the superficial and deep Achilles tendons and surrounding tissue of the hind legs (bovine only).</p>
Ligaments	<p>Provided whole or in portions of the ligamentum nuchae (paddywhack or back strap) from the neck and thoracic region of the carcass (bovine only). Probably edible, but usually processed into a dog chew.</p>
8 Blood	<p>Provided in a stabilized form, fibrin removed, and as blood serum or blood plasma, either cooled or frozen.</p>
Thymus gland	<p>Provided as the whole gland with the surrounding fat and connective tissue either retained or removed. Sometimes referred to as the sweetbreads.</p>

### Morphology

The list of offal provided above represents many different types and combinations of tissue. Understanding the differences in tissue is helpful if one's goal is to cook and eat offal.

There are five types of tissue found in cattle, sheep, goats, and pigs: muscle tissue, connective tissue, nervous tissue, epithelial tissue, and mineralized tissue.<sup>12</sup> Bone is mineralized tissue. Since bone is not considered edible, it will be ignored in the following discussion.

There are three types of muscle tissue: skeletal or striated, cardiac, and smooth.<sup>13</sup> In older texts, these muscle types were referred to as red, heart, and white muscles.<sup>14</sup>

Skeletal muscle is the muscle of most meat. It's the muscle that an animal voluntarily contracts and relaxes when it decides to walk, run, swat a fly, or chew. Skeletal muscle is also referred to as striated muscle because it contains repeating functional units called sarcomeres, which give skeletal muscle its striated appearance.<sup>15</sup> To our eyes, skeletal muscle appears to be made up of parallel, red-coloured fibres, what is sometimes referred to in recipe instructions as the meat's grain.<sup>16</sup> Among the different types of offal, the muscles of the head and tail are skeletal muscle. They also contain a relatively high amount of collagen.

## It's All Edible: Four Views of Offal

Exposing these muscles to heat to convert the collagen to gelatine makes them readily edible.<sup>17</sup> These muscles, when trimmed, are an exception to my definition of offal being not primarily skeletal muscle. Tongue is another example of skeletal muscle that is also offal.<sup>18</sup>

Heart muscle is an involuntary muscle. It contracts and relaxes in a continuous rhythm from before an animal's birth until a short while after it dies. It is also striated muscle. The heart is lined with epithelium, which renders the heart waterproof.<sup>19</sup> Cartilaginous valves open and close as blood is pumped from one chamber to the next by the involuntary muscle contractions. In preparing a heart for cooking, the organ must be opened, and any blood clots found, washed out. It is usually wise to strip off any connective tissue bound to the heart's exterior and do the same on the interior. Depending on the preparation, the fat of the outer surface may be removed or left in place. Although the muscle in a heart is well-used and theoretically tough as shoe leather, there are quick techniques that produce tasty results without a long braise.<sup>20</sup>

Smooth muscle is involuntary and non-striated. In animals, it is sometimes referred to as white muscle because it resembles connective tissue and may even be found covered in the same.<sup>21</sup> It is white and somewhat bland in flavour because smooth muscle is poorly supplied with blood.<sup>22</sup> Its movement is slow but determined. It is slow muscle that moves food in its various digested states from the entry to past the exit. Tripe is produced by scalding and bleaching a rumen, reticulum, or omasum of a ruminant and stripping it of its mucosal lining leaving mostly smooth muscle.<sup>23</sup>

Connective tissue consists of three main components: fibres, ground substance, and cells.<sup>24</sup> The fibres can be divided as elastic, reticular, and collagenous. In one simplistic view, connective tissue binds and supports the body together.<sup>25</sup> In the case of tendons, it's collagenous fibres that attach muscles to bone. In the case of adipose tissue, or fat, its reticular fibres that keeps it all together. Dense connective tissue can be found all over the body. It's the tissue that wraps the skirts and overlaps the muscle's connection to the diaphragm and the peritoneal wall. It's mostly what makes up the capsule that covers a testis or the thymus gland.

Nervous tissue enables a response to stimuli and coordinates bodily functions. It is consumed in the form of brains. From an eating standpoint, brains are similar to the edible glands, but physiologically, glands derive from epithelial cells whereas brains are more complex. Both may be presented for sale with a connective tissue covering, or they may be sold already peeled. Fresh brains are particularly perishable, especially when compared to skeletal muscle.<sup>26</sup>

Epithelial tissue covers the exterior body as skin and lines interior surfaces such as the peritoneal cavity as the peritoneum.<sup>27</sup> All glands form from an ingrowth of an epithelial surface.<sup>28</sup> Animal skin poses problems for the cook because of the need to remove hair from the slaughtered animal. Pigskin is edible, but it requires special handling in the slaughterhouse to remove the bristles. Skin from hides is generally considered inedible.

## Practicalities

The availability of offal to the consumer is nearly a perfect model of the classic concept of supply and demand.<sup>29</sup> The model, in this case, is modified by ethnic shrinking, marketplace changes, fads, government regulations, slaughterhouse practicalities, restaurant and butcher practicalities, and non-edible competition.

Ethnic shrinking is the concept that as first generation immigrants decrease in population and are replaced as consumers by the second generation, the demand for food items from the motherland decreases. The first generation, although they may accept certain food items of their adopted land, still has a desire for products from the group's origin. The desire is greater with adults than it may be with children, where memories of the homeland are also stronger.

Twenty years ago, I could walk into one of the butcher shops in my area that catered to the local Latino community, the majority of which were from the Mexican state of Michoacán, and find a whole, fresh pig's head in the meat case. Ten years ago, the meat case no longer held a pig's head, but the butcher had many in the freezer. Today, if I want a pig's head, I must special order it. The demand that was present when there were more first generation immigrants is no longer there now that their children are buying the groceries.

10 My paternal grandparents emigrated from Germany in their late teens. My grandmother couldn't cook. I never saw them eat German food. My maternal grandparents came to America from Germany as sponsored refugees. My grandfather was sixty years old, and my grandmother was seven years younger. She was an excellent, trained cook. Whenever I was left with her as a child, I ate German food. My mother, who emigrated at the age of twenty, was not as good of a cook as her mother, but we still ate the offal common to her native Munich. Brains, sweetbreads, liver, and tongue, along with sausages made with natural pork casings, were all common on the dinner table when I was growing up. By the time I completed college in the mid-seventies, grocery stores had become supermarkets and independent butchers were difficult to find in my mother's neighbourhood. The markets in suburbia had moved away from offal, and so had my mother.

The concept of a grocery store has changed dramatically since Piggly Wiggly became the first self-service grocery store in 1916.<sup>30</sup> The first supermarket, a store with separate product departments, was started in 1930.<sup>31</sup> In 1967, Iowa Beef Packers introduced boxed meat and supermarket chains started replacing concessionaire butcher shops with in-house staff that opened the boxes, performed some minor cutting and trimming, and repackaged the meat on plastic trays with the store's labelling.<sup>32</sup> Where in the past it was possible to obtain offal from a butcher, butchers became scarce, and along with them, offal became scarce.

Even though the average supermarket carries more than forty-two thousand items, offal may be hard to find.<sup>33</sup> I can find canned escargot at my local hypermarket, but no fresh offal. The only offal available frozen is pre-sliced beef liver. If I head to a nearby stand-alone

## It's All Edible: Four Views of Offal

butcher that sources boxed primals, then some fresh liver is available, but I'm lucky to live near a number of butcher shops. Most people don't.

A different form of marketplace change occurs in locations such as rural America where traditions are forgotten or modernized.<sup>34</sup> As succeeding generations continue to move away from their parent's or grandparent's way of eating, and fast food continues to influence eating habits, old food customs are lost.

Just because the local market for offal is fading from view, export sales of offal are increasing. A trend that started in the 1970s with the United States exporting a majority of the offal harvested has continued to this day.<sup>35</sup> A similar situation is true for the United Kingdom.<sup>36</sup>

Whether the current phase of nose-to-tail dining started with Fergus Henderson or some lesser-known chef, this excuse for whole-animal dining became popular in the mid-1990s and has continued to sporadically appear on the worldwide dining scene.<sup>37</sup> Its biggest single effect, twenty years later as most whole-animal restaurants have moved onto a different theme, is the wide inclusion of pork belly on modern menus. Pork belly is not offal, but people previously shied away from it, unless it was called bacon, because of its high fat content. Chefs love to prepare pork belly because of its high profit margin.

In the United States and many countries, the national government regulates the slaughtering of animals and the harvesting of their meat.<sup>38</sup> Slaughterhouse operators must work within the limits set forth in these regulations or risk being shut down. With respect to offal, this means that when the carcass is eviscerated, the viscera intended for human consumption must be kept aligned with the carcass until the latter is inspected and passed. A similar case is true for non-visceral items such as feet or the mammary glands. Some offal may require additional inspection.<sup>39</sup>

In the United States, all meat intended for interstate sales must be federally inspected. State inspection is allowed as long as the meat isn't transported across state lines with the exception of slaughterhouses where the state employees are certified to act as agents for the USDA's Food Safety Inspection Service.<sup>40</sup> There are also custom-exempt slaughterhouses that process animals only for the animal's owner. Technically, the meat and by-products cannot be sold and their use is limited to the owner's household and non-paying guests and employees.<sup>41</sup>

United States regulations also prohibit the selling of certain offal for human consumption. Prohibited items include thyroid glands, laryngeal muscle tissue, and lungs.<sup>42</sup>

The ability of an individual slaughterhouse to fabricate individual offal items is often a function of scale. Each animal has a fixed number of harvestable parts, and a case of any unique part may be more than a small facility produces in a single day. Once a carcass is passed by the inspector, the slaughterhouse must either quickly process all the offal, or pass it along to a renderer who may in turn pass it along to an aggregator for processing. This is especially common with intestines. These are usually processed by a third party into sausage casings.

## It's All Edible: Four Views of Offal

In-house processing requires each item to be trimmed to a saleable condition and then packaged and frozen. Some items, such as stomachs intended for the tripe market, may need to be cleaned, scalded, and bleached.<sup>43</sup> Special equipment is required perform this process in any substantial volume.

Items such as blood require special collection and processing equipment.<sup>44</sup> To harvest pork skin, the slaughterhouse must have the ability to scald the hog carcass before eviscerating the animal. Small slaughterhouses often lack the special equipment required for this.

The output from a slaughterhouse will never perfectly match demand. At times, the offal output will exceed orders. The processed offal, since it more perishable than skeletal muscle, must be frozen and stored until it can be sold. This requires freezer storage space which in addition to its initial building cost has significant energy requirements. The longer the offal is in storage, the more it costs to keep it frozen.

The issues for restaurants and butcher shops are similar. They both need to be able to obtain sufficient product to sell while at the same time ensuring that they sell it before it spoils. In an ethnic neighbourhood, that shouldn't be a problem for the offal associated with that ethnic group. In other neighbourhoods, selling out a complete purchase may be problematic.

Chefs and butchers sourcing whole carcasses have a separate issue with offal. Although the carcass is purchased directly from a farmer, the slaughtering is usually performed by a third party. The abattoir charges a fee based on the their returning just a dressed carcass to the farmer. The abattoir keeps the offal and resells it to a renderer, who in turn sells it to an aggregator who processes the offal for wholesale distribution.<sup>45</sup> If the abattoir processes enough animals each week, and has the processing capabilities, they may process and sell the offal themselves. If the chef or butcher pays, by way of the farmer, for the kidneys, heart, and liver, he will get those items, but there will be no guarantee that the organs came from the specific carcass they purchased. This all assumes that the butcher is in a locale where customers purchase offal, which is unlikely if the butcher doesn't have ethnic clientele. Similarly, the chef must have adventuresome customers, or else the offal will become expensive staff meals.

When chef and butchers purchase offal from the wholesale market, they are often required by suppliers to purchase in case lots. If less than case quantities are available, they may have to pay a substantially higher unit price for the same item. Assume that the chef or butcher wishes to buy a whole beef liver. These weigh about 4.5 kilograms (10 pounds) each before peeling and deveining, and they are often only available frozen. One liver will yield about forty portions. Liver spoils rapidly. Any thawed portions need to be sold in a day or two, or turned into a cooked value-added product, such as a or luncheon meat. Selling liver in retail market is probably easier than selling beef hearts, lamb kidneys, and pig ears.

The dressed carcass from the typical steer, before chilling, will weigh about sixty percent of the live animal weight.<sup>46</sup> The forty percent that is not part of the carcass does not go

## It's All Edible: Four Views of Offal

to waste. In all but the smallest of slaughterhouses, all of the remainder is sold for use as offal, pet food, or non-food applications. So many animal parts are components of other products that people seriously wanting to avoid using animal products have to look at the ingredients going into dietary supplements, pharmaceutical drugs, cosmetics, household cleaning products, clothing and footwear, and many other items in common use.<sup>47</sup> Some of the uses, such as those for hides, trace back for millennia. Others such as extracting oestrogens and progesterone from bovine ovaries are more recent.<sup>48</sup> Some of the non-food uses are so profitable that for some large processors, there is more income to be made from by-products than from skeletal muscle.

### Conclusion

In the thirty-five years that have transpired since I traipsed through San Francisco's Chinatown with tourists in tow, a large, first-generation Chinese community has developed closer to my home. Now when I am in need of pig's ear, snout, or intestines, or chicken feet, or duck tongues or gizzards, I drive a few miles to a supermarket where all the offal I desire is available on plastic-film-covered Styrofoam trays. When I walked those three blocks in San Francisco a few months back, most of the food items I found in the past were still there although many of the shops had changed, the live-poultry truck was gone, and a different first-generation group of Chinese-speaking immigrants were walking the streets.

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# It's All Edible: Four Views of Offal

## Notes

1. This time period was before the 1989 Loma Prieta Earthquake struck the San Francisco Bay Area. Saturdays were particularly busy because whole families living outside the city would come to Chinatown to shop and then have lunch at one of the two principal dim-sum restaurants. The earthquake damaged the only freeway leading into Chinatown, and after it was closed, the Saturday-morning foot traffic decreased significantly.
2. Other euphemisms for offal include: 'odd bits' (Jennifer McLagan, *Odd Bits: How to Cook the Rest of the Animal* (Berkeley: Ten Speed Press, 2011) p. 139); 'edible meat co-products' (*Standard for Edible Meat Co-Products* (New York: United Nations, 2008 p. 14); 'by-products' (*Weekly National Carlot Meat Report* (Des Moines: Livestock, Poultry & Grain Market News, Agricultural Marketing Service United States Department of Agriculture, 19 March 2016).
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4. The concept of 'falling off' is in line with the first definition listed in the Oxford English Dictionary which uses as an example 'as husks from milling grain'. 'offal, n. and adj.' *OED Online*. Oxford University Press, March 2016 [accessed 23 March 2016]
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6. Although the *OED Online* claims that 'offal' may occasionally be used as a count noun, in cookery, it is unlikely to be so non-specific as to call for 'a piece of offal' in a recipe.
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## It's All Edible: Four Views of Offal

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