

Rendering (animal products)

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Rendering is a process that converts waste animal tissue into stable, value-added materials. Rendering can refer to any processing of animal products into more useful materials, or, more narrowly, to the rendering of whole animal fatty tissue into purified fats like lard or tallow. Rendering can be carried out on an industrial, farm, or kitchen scale.

The majority of tissue processed comes from slaughterhouses, but also includes restaurant grease and butcher shop trimmings and expired meat from grocery stores. This material can include the fatty tissue, bones, and offal, as well as entire carcasses of animals condemned at slaughterhouses, and those that have died on farms, in transit, etc. The most common animal sources are beef, pork, sheep, and poultry.

The rendering process simultaneously dries the material and separates the fat from the bone and protein. A rendering process yields a fat commodity (yellow grease, choice white grease, bleachable fancy tallow, etc.) and a protein meal (meat and bone meal, poultry byproduct meal, etc.).

Rendering plants often also handle other materials, such as slaughterhouse blood, feathers and hair, but do so using processes distinct from true rendering.

The occupation of renderer has appeared in "dirtiest jobs" listicles.^[1]

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Process variations

The rendering process varies in a number of ways.

- Whether the end products are to be used as human or animal food depends on the quality of input material and the processing methods and equipment.
- The material may be processed by wet or dry means. In wet processing, either boiling water or steam is added to the material, separating fat into a floating phase. In dry processing, fat is released by dehydrating the raw material.
- The temperature range used may be high or low.
- Rendering may be done either in discrete batches or in a continuous process.
- The processing plant may be operated by an independent company which buys input material from suppliers, or by a packing plant that produces the material in-house.

Rendering processes for edible products

Edible rendering processes are basically meat processing operations and produce lard or edible tallow for use in food products. Edible rendering is generally carried out in a continuous process at low temperature (less than the boiling point of water). The process usually consists of finely chopping the edible fat materials (generally fat trimmings from meat cuts), heating them

with or without added steam, and then carrying out two or more stages of centrifugal separation. The first stage separates the liquid water and fat mixture from the solids. The second stage further separates the fat from the water. The solids may be used in food products, pet foods, etc., depending on the original materials. The separated fat may be used in food products, or if in surplus, it may be diverted to soap making operations. Most edible rendering is done by meat packing or processing companies.

One edible product is greaves, which is the unmeltable residue left after animal fat has been rendered.

An alternative process cooks slaughterhouse offal to produce a thick, lumpy "stew" which is then sold to the pet food industry to be used principally as tinned cat and dog foods. Such plants are notable for the offensive odour that they can produce and are often located well away from human habitation.

Rendering processes for inedible products

Materials that for aesthetic or sanitary reasons are not suitable for human food are the feedstocks for inedible rendering processes. Much of the inedible raw material is rendered using the "dry" method. This may be a batch or a continuous process in which the material is heated in a steam-jacketed vessel to drive off the moisture and simultaneously release the fat from the fat cells. The material is first ground, then heated to release the fat and drive off the moisture, percolated to drain off the free fat, and then more fat is pressed out of the solids, which at this stage are called "cracklings" or "dry-rendered tankage". The cracklings are further ground to make meat and bone meal. A variation on a dry process involves finely chopping the material, fluidizing it with hot fat, and then evaporating the mixture in one or more evaporator stages. Some inedible rendering is done using a wet process, which is generally a continuous process similar in some ways to that used for edible materials. The material is heated with added steam and then pressed to remove a water-fat mixture which is then separated into fat, water and fine solids by

stages of centrifuging and/or evaporation. The solids from the press are dried and then ground into meat and bone meal. Most independent renderers process only inedible material.

History

The development of rendering was primarily responsible for the profitable utilization of meat industry by-products, which in turn allowed the development of a massive industrial-scale meat industry that made food more economical for the consumer. Rendering has been carried out for many centuries, primarily for soap and candle making. The earliest rendering was done in a kettle over an open fire. This type of rendering is still done on farms to make lard (pork fat) for food purposes. With the development of steam boilers, it was possible to jacket the kettle to make a higher grade product and to reduce the danger of fire. A further development came in the nineteenth century with the use of the steam "digester" which was simply a tank used as a pressure cooker in which live steam was injected into the material being rendered. This process is a wet rendering process called "**tanking**" and was used for both edible and inedible products, although the better grades of edible products were made using the open kettle process. After the material is "tanked", the free fat is run off, the remaining water ("tank water") run into a separate vat, and the solids removed and dried by both pressing and steam-drying in a jacketed vessel. The tank water was either run into a sewer or it was evaporated to make glue or protein concentrate to add to fertilizer. The solids were used to make fertilizer.

Upton Sinclair wrote an expose (1906) on the Chicago, IL meat processing industry which created public outrage. His work helped the passage of the Pure Food and Drug Act of 1907 which paved the way for the creation of the FDA.

The pressure tank made possible the development of the Chicago meat industry in the United States, with its huge concentration in one geographic area, because it allowed the economic disposal of byproducts which would otherwise overwhelm the environment in that area. At first, small companies

that sprang up near the packers did the rendering. Later the packers themselves took up the industry once they saw the potential. Gustavus Swift, Nelson Morris, and Lucius Darling were among the early pioneers of the U.S. rendering industry with their personal backing and/or direct participation in the developing rendering industry.

Technological innovations came rapidly as the 20th century advanced. Some of these were in the uses for rendered products and others were in the rendering methods themselves. In the 1920s, a batch dry rendering process was invented, in which the material was cooked in horizontal steam-jacketed cylinders that were similar to the fertilizer dryers of the day. Advantages claimed for the dry process were economy in energy use, a better protein yield, faster processing, and fewer obnoxious odours attending the process. Gradually, over the years, the wet "tanking" process was replaced with the dry process, so that by the end of World War II, most rendering installations used the dry process. In the 1960s, continuous dry processes were introduced, one using a variation of the conventional dry cooker and the other making use of a mincing and evaporation process to dry the material and yield the fat. In the 1980s, high energy costs popularized the various "wet" continuous processes. These processes were more energy efficient and allowed the re-use of process vapours to pre-heat or dry the materials during the process.

After World War II synthetic detergents came on the scene which eventually displaced soaps for both domestic and industrial washing. In the early 1950s over 50% of the inedible fat market disappeared. Diversion in these materials into animal feeds soon replaced the lost soap market and eventually became the single largest use for inedible fats.

The widespread use of "boxed beef" in which the beef was cut up into consumer portions at the packing plant rather than at the retail level in local butcher shops and markets meant that the fat and meat scrap raw materials for renderers stayed at the packing plants and were rendered there by packer renderers, rather than by the "independent" rendering companies.

The rejection of animal fats by diet-conscious consumers led to a surplus of edible fats and their resultant diversion into soapmaking and oleochemicals, displacing inedible fats and contributing to the market volatility of this commodity.

Advantages and disadvantages

The rendering industry is one of the oldest recycling industries, and made possible the development of a large food industry. The industry takes what would otherwise be waste materials and makes useful products such as fuels, soaps, rubber, plastics, etc. At the same time, rendering solves what would otherwise be a major disposal problem. As an example, the USA recycles more than 21 million metric tons annually of highly perishable and noxious organic matter. In 2004, the U.S. industry produced over 8 million metric tons of products, of which 1.6 million metric tons were exported.

Usually, materials used as raw materials in the rendering process are susceptible to spoilage. However, after rendering, the materials are much more resistant to spoiling. This is due to the application of heat either through cooking in the wet rendering process or the extraction of fluid in the dry rendering process. The fat obtained can be used as low-cost raw material in making grease, animal feed, soap, candles, biodiesel, and as a feed-stock for the chemical industry. Tallow, derived from beef waste, is an important raw material in the steel rolling industry providing the required lubrication when compressing steel sheets. The meat and the bones (which are in a dry, ground state) are converted to what is known as meat and bone meal.

In the absence of the rendering industry, the cost of waste disposal of waste animal material would be very high and would place a significant economic and environmental burden on areas involved in industrial scale slaughtering. This cost may manifest itself through the expensive use of sanitary landfills, incinerators and other similar waste disposal techniques without yielding profit directly out of it leading to the incurrence of opportunity costs. Using substitute products to rendering products may not necessarily prove to be lesser in cost.

BSE

For many years meat and bone meal was fed to cattle. This practice is now prohibited in developed countries because it is believed to be the main route for the spread of bovine spongiform encephalopathy (mad-cow disease, BSE), which is also fatal to human beings.

Kitchen rendering

Rendering of fats is also carried out on a kitchen scale by chefs and home cooks. In the kitchen, rendering is used to transform butter into clarified butter, suet into tallow, pork fat into lard, and chicken fat into schmaltz.

See also

- Animal slaughter
- Animal euthanasia
- Dead Horse Bay
- Flensing
- Vegetable oil
- Whale oil

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- Link above broken - NRA link here to National Renderers Association [nationalrenderers.org/assets/essential_rendering_book.pdf *Essential Rendering Overview (16 Page Document)*]

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