

By-Products of the Meat Industry

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Objectives:

- (1) To familiarize with the importance of by-products to the me industry.
- (2) To discuss the ultimate uses of edible and inedible by-products in the meat industry.
- (3) To show the various uses of animal by-products for the pharmaceutical industry.

- By-products in the livestock industry are often time responsible for the profitability of operating packing plants.
- A ball-park figure for the contribution of by-products to the value of livestock would be 10% (depending on the specie).
- The following chart shows the relationship between live weight and carcass components and by-product yields:

Item	Steer	Lamb	Pig
Grade	Choice	Choice	U.S. #1
Live weight, lbs	1000	100	220
Dressed carcass, lbs	600	50	155
Retail cuts, lbs	420	35	125
By-products, lbs			
Hide or pelt	80	15	--
Edible fats	110	9	3
Variety meats	38	3	9
Blood	40	50	9
Inedible fats, bone, and meat scraps, lbs	175	22	18
Unaccounted items (stomach contents, shrink, etc.)	140	11	26

Edible meat by-products

Raw by-product	Principal use
Brains	Variety meat
Liver	Variety meat
Heart	Variety meat
Kidneys	Variety meat
Spleen (melt)	Variety meat
Sweetbreads	Variety meat
Tongue	Variety meat
Oxtails	Variety meat
Cheek and head trimmings	Sausage ingredient
Beef extract	Soups
Blood	Sausage component

<p>(a) Suckling calves (b) Pork (c) Beef (1st and 2nd)</p>	<p>Rennet for cheese making Sausage container, ingredient Sausage ingredient, tripe</p>
<p>Bones</p>	<p>Gelatin for confectioneries, ice cream, and jellied food products</p>
<p>Fats (a) Cattle, calves, lambs & sheep</p>	<p>Shortening, candies, chewing gum</p>
<p>(b) Pork)</p>	<p>Shortening (lard</p>
<p>Intestines, small</p>	<p>Sausage casings</p>
<p>Intestines,</p>	<p>large (pork) Chitterlings</p>
<p>Intestines, large</p>	<p>Sausage casings</p>

Esophagus (weasand)

Sausage ingredient

Pork skins

Gelatine for confectioneries, ice cream, and jellied food products; french fried pork skins

Calf skin

trimmings Gelatine for
confectioneries, ice cream, and
jellied food products

Inedible meat by-products

Hide (cattle and calves)	Leather and glue	numerous leather goods paper boxes sandpaper plywood
	Hair	felts plaster binder upholstery
Pork skins	Tanned skin	leather goods
Pelts	Wool	textiles
	Skin	leather goods
	Lanolin	ointments
Fats	Inedible tallow	industrial oils lubricants glycerin
	Tankage Cracklings Stick	livestock and poultry feeds
		industrial oils

	Dry bone	glue hardening steel
Bones	Bone meal	animal feed fertilizer
	Blood albumen	leather preparations textile sizing
Cattle feet	Neatsfoot stock	fine lubricants
	Neatsfoot oil	leather preparations
Glands	Pharmaceuticals	medicines
	Enzyme preparations	industrial uses
Lungs		pet foods

Tallows and Greases

- Titer -- congealing or solidification point of the fatty acids in the fat. Tallow -- fat having a titer above 40 C.
- Grease -- fat having a titer below 40 C.
- Dry rendering process -- fatty tissues are placed in horizontal, steam-jacketed cylinders equipped with sets of internal rotating blades. Fat cells are ruptured, and the melted fat is released from the supporting tissues. When sufficient moisture has cooked out, the mixture is filtered or strained to remove the cracklings from the rendered tallow or grease.

Animal Feeds and Fertilizers

- Dried blood (blood meal) -- made by coagulating fresh blood with steam, draining off the liquid, and drying the coagulum. Meat meal -- made from the proteinaceous materials from the inedible rendering process.
- Steamed bone meal -- made by cooking bones with steam, under a high pressure, in order to remove any fat and meat that may be left on them.

Gelatin and Glue

- Gelatin -- made from skins or hides, connective tissues, cartilage, and bones of cattle and calves. Cooking in water converts the collagen in these materials to gelatin. Glue -- made from the same items as gelatin, but is extracted from these materials by successive heating's in water under specific temperature conditions.

Pharmaceuticals

- **Glands**
- Adrenal -- epinephrine is extracted from the adrenal medulla and adrenocortical extract from the adrenal cortex.
- Ovaries -- used as a source of estrogens and progesterone.
- Pancreas -- yields insulin and trypsin.

Tissues and Organs

- Blood -- source of albumin and amino acids. Bone -- source of calcium and phosphorous.
- Intestines -- surgical sutures and condoms.
- Liver -- liver extracts and bile extract, which can be used to make cortisone.
- Lungs -- heparin
- Spinal cord -- source of cholesterol, which is used to manufacture vitamin D.
- Stomach -- rennet (from calves), mucin (from pigs), and pepsin (from pigs).

Other by-products

- Fetal calf blood -- used for cancer and AIDS research.
- Aorta valves -- for replacement of defective human heart valves.
- Fetal pigs -- used for biology teaching.
- Gall stones -- sold as aphrodisiacs in the Far East.

- Parathyroid -- parathyroid hormone extract is used to prevent large scale muscular rigidity.
- Pituitary -- source of ACTH (adrenocorticotrophic hormone).
- Testes -- source of hyaluronidase.
- Thyroid -- source of thyroxine and calcitonin.