



# The Journey of Chicken Breast

## Background information

Food chosen: Cooked Chicken Breast ~172g (Raman, 2017)

The ingredients used for the cooking process is not qualified in this report and thus, is not accounted for.

## Mouth and Oesophagus

The journey of the cooked chicken breast starts in the mouth, where mechanical and chemical digestion happens. The tongue moves the chicken breast around the mouth as the teeth chew and grind it; the saliva aids the mechanical digestion by using chemical digestion. The saliva consists of complex enzymes such as amylase that break down the starch in the chicken breast into sugars. An adult human has 32 teeth: four molars, two canines, four premolars and six molars to help break down the chicken into smaller pieces (**refer to figure 1**). This chewing process to break down foods is called *mastication* (Newton et al., 2020). Eventually, the chicken breast becomes a 'bolus' or a mixture of chicken and saliva shaped like a sphere. This ball of

substance is pushed into the pharynx and later into the oesophagus.

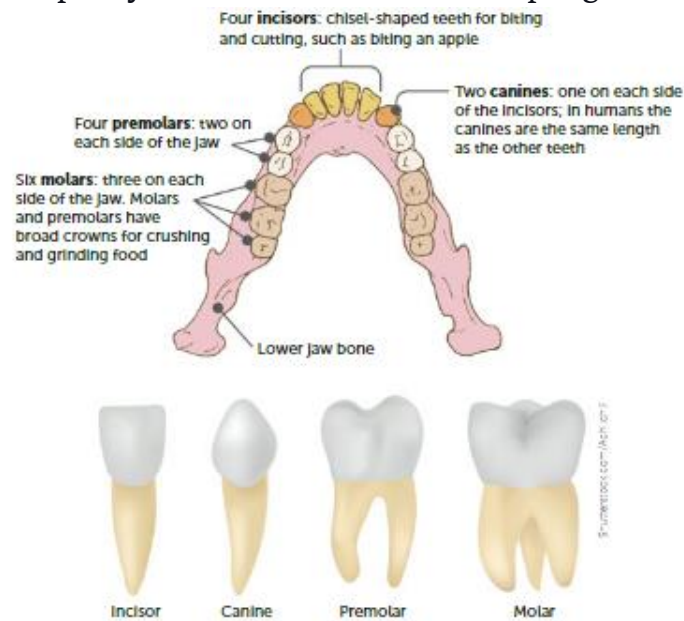


Figure 1

The bolus is pushed into the 25cm long oesophagus by passing through the upper oesophageal sphincter (Sivarao, D. V., & Goyal, R. K., 2000). The length of the oesophagus has circular muscle fibres contracting and relaxing, which pushes the bolus down into the stomach; the lining of the oesophagus has mucus to aid in lubrication. This process is called Peristalsis (Newton et al., 2020), and it takes approximately 5 to 6 seconds (Goyal & Mashimo, 2006).

## The stomach

The bolus is led to the stomach through the oesophagus. Here, another sphincter is present to stop stomach acid from going up the oesophagus. In the stomach, gastric juices such as mucus, hydrochloric acid, and digestive enzymes help break down the bolus into chyme. Chyme is a "... a semifluid mass of partially digested food that leaves the stomach." (Newton et al., 2020). This process takes 2 to 8 hours (Newton et al., 2020).

## Details

The stomach is specially equipped with muscles that combine and stir the bolus so that it can adequately mix with the digestive juices. Another speciality

of the stomach is that it produces HCl (Hydrochloric Acid). This acid breaks down the bolus and activates the enzyme pepsinogen into pepsin, and it is secreted by the parietal cells. Due to the high acidity of HCl, it dissolves any introducers in the stomach, such as bacteria. It also means that a barrier of mucus must always be present to prevent the HCl from dissolving the stomach (Heda et al., 2022).

Pepsinogen is an enzyme excreted by the Gastric chief cells; when it comes in contact with HCl, it begins to activate and convert to pepsin which disassembles amino acids found in the large amounts of protein in chicken breasts.

## Small intestine (Chemical Digestion)

The chyme leaves the stomach through the *pyloric sphincter* and into the small intestine. The small intestine is split into the *Duodenum*, *Jejunum*, and *Ileum*. Most of the chemical digestion occurs in the *duodenum*. Pancreatic juices are released into the duodenum via bile ducts of the pancreas to subdue the acidity in the chyme. Pancreatic juices include Pancreatic amylase (break down of starch), Trypsin (breaks apart proteins into peptides), pancreatic lipase (enzyme for breaking down fats/ glycerol), deoxyribonuclease and ribonuclease (breaks down DNA and RNA) (Newton et al., 2020). 3.6 grams of fat is present in chicken breast to digest this fat, the bile created by the liver and stored in the gall bladder. Bile has bile salts that help 'emulsify' the fats for better lipase chemical digestion (Newton et al., 2020).

The chyme moves further along the small intestine through the jejunum and ileum; the whole process takes around 6 to 8 hours (Rajan, 2022).

## Small intestine (Nutrients absorption)

Nutrients, vitamins, fatty acids, proteins, simple sugars and amino acids are absorbed in the small intestine through the 'finger-like projections. These villi increase the surface area since there is a greater chance that the villi absorb the stomach contents. The villi have microvilli on them (**refer to figure 2**) that further increase the surface area; they are used by cells contained in the villi (Newton et al., 2020). The transport of nutrients can happen through active

transport or simple diffusion. Simple diffusion is where there are more contents outside the villi than inside, so the nutrients naturally diffuse through the villi to the cells. Active transport is where the cells have to spend energy or ATP to bring in the nutrients from the outside to the cells and lacteal (Lacteal is a lymph vessel that absorbs lipids) (Newton et al., 2020).

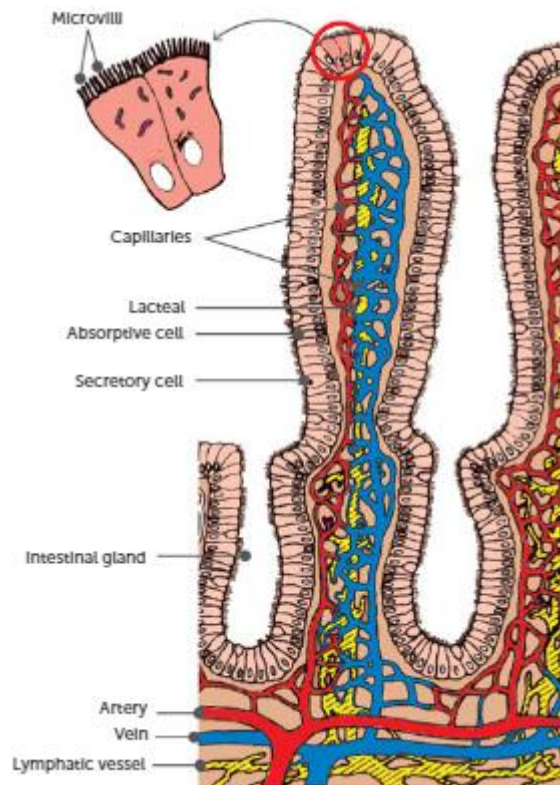


figure 2

## Material Use

6.2 grams of fat is in one chicken breast, 53 grams of protein, and 284 calories (Groves, 2022). The fat is used later for energy to move, and the protein is used to repair muscles and tissues.

## Large intestine

After the mostly digested chicken breast passes through the ileum, it enters the large intestine. The large intestine is used mainly to absorb water and break down remaining substances by gut bacteria. The once chicken breast takes roughly 18-24 hours to complete its journey through the large intestine. Water in the large intestine is absorbed through osmosis and some electrolytes.

The bacteria create vitamins such as vitamin K, B and Biotin when breaking down the faecal matter.

## Elimination and faeces

The faecal matter moves through the large intestine, where water that wasn't previously absorbed is absorbed into the large intestine. The bacteria break down the remaining material and create minerals/vitamins as a by-product. The faeces move through the colon, the longest part of the large intestine. The ascending colon, then into the transverse colon, descending colon, and finally at the sigmoid colon. When the faecal matter is ready to undergo 'elimination', it will rest in the rectum and the process of elimination begins. "The muscles around the anus relax, and the faeces can be passed out." (Newton et al., 2020)

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