



Poultry Products & Technology

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2024

QUALITY CHARACTERISTICS OF POULTRY PRODUCTS

Poultry consumption has more than doubled over the last 50 years and continues to grow. In the 1970s the average person consumed 22 kg of poultry every year. In 2008 that number was projected to be 47 kg per person according to the Economic Research Service and the United States Department of Agriculture.

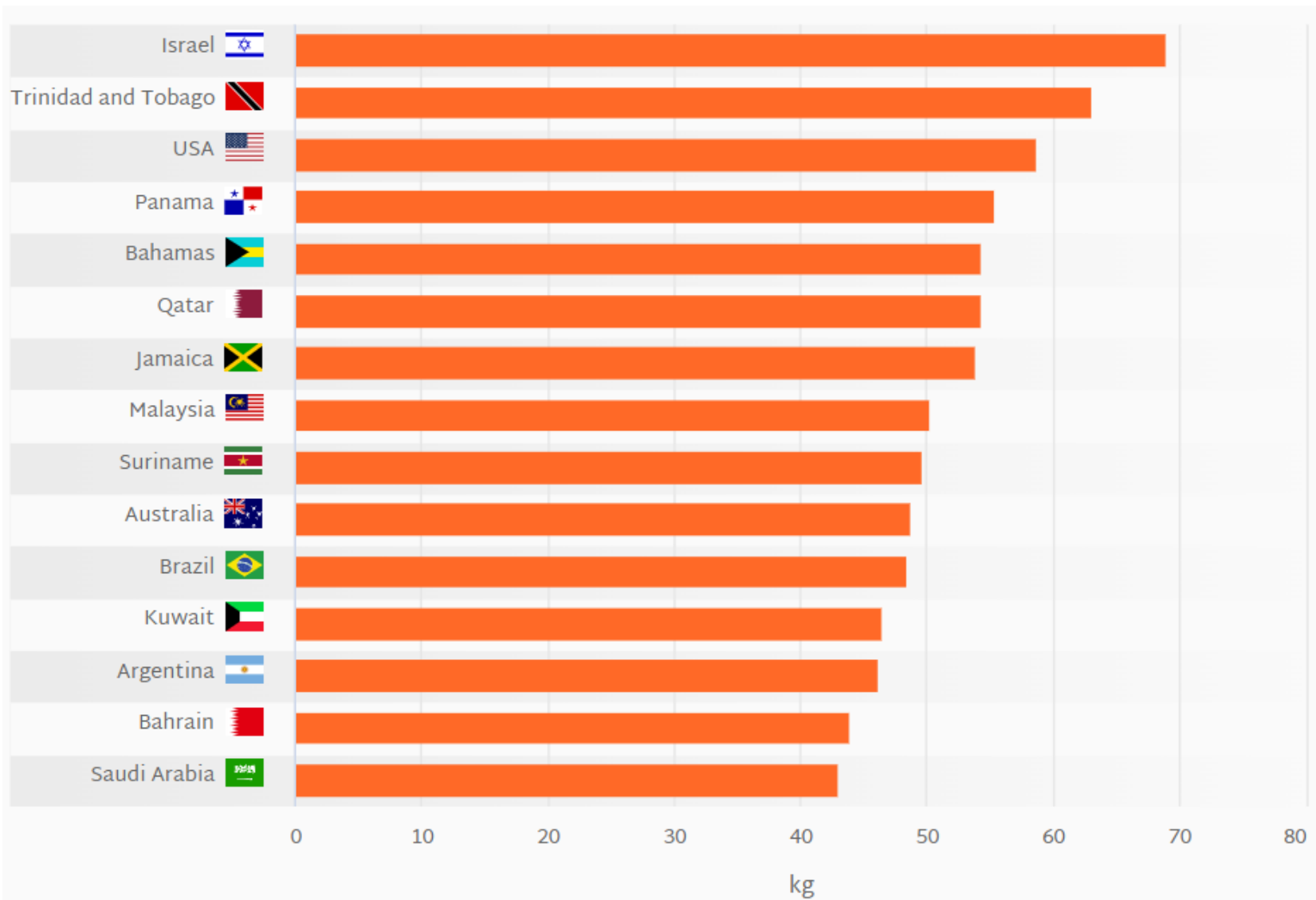
Of this total, it is predicted that 39 kg will be chicken and 7.5 kg will be turkey. Chicken and turkey are among the most commonly consumed types of poultry.

The poultry market has grown substantially due to various marketing practices, such as selling individual cuts. A prime example of this is the chicken wing, which has become very popular in recent years.

In 2007, 2.25 billion pounds of chicken was marketed solely as wings. Another reason for the increased popularity of poultry is its low fat and cholesterol contents.

Poultry Meat Consumption Per Capita

Based on a comparison of 165 countries in 2020, Israel ranked the highest in poultry meat consumption per capita with 68.9 kg followed by Trinidad and Tobago and USA. On the other hand, of the scale was Chad with 0.480 kg, Burundi with 0.560 kg and Ethiopia with 0.590 kg.



Source: Faostat

Last Updated: Apr 23, 2023

Poultry meat consumption per capita reached 5.38 kg in 2020 in Iraq, according to Faostat. This is 29.1% less than in the previous year.

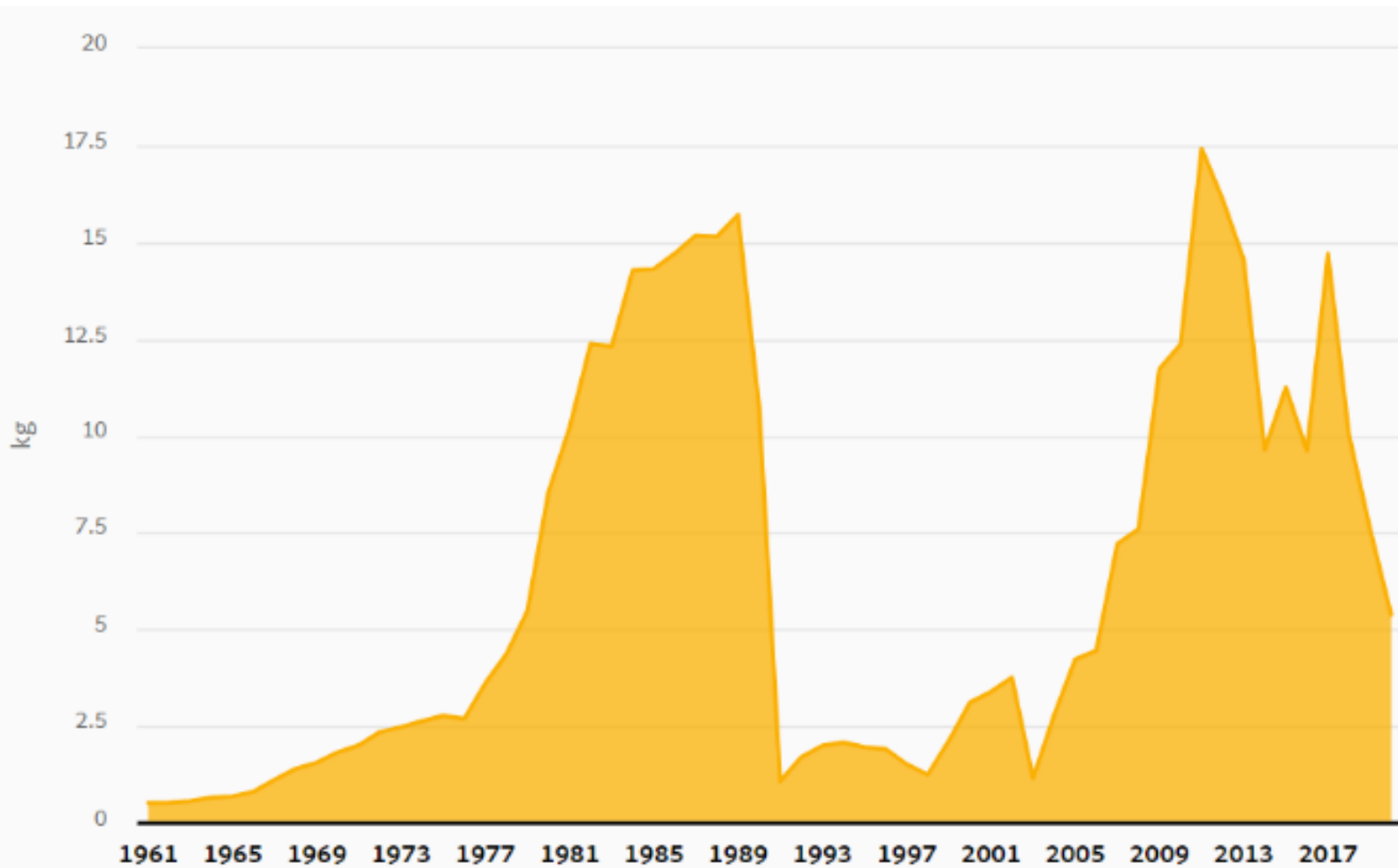
Poultry meat consumption per capita reached 12.5 kg in 2021 in Iraq, according to Faostat.

Historically, poultry meat consumption per capita in Iraq reached an all-time high of 17.4 kg in 2011 and an all-time low of 0.520 kg in 1961.

Iraq has been ranked 127th within the group of 165 countries we follow in terms of poultry meat consumption per capita.

Average chicken meat consumption per capita in 2023:

(Iraq 9.6, Iran 27.2, Turkey 20. Saudi Arabia 44.6 Jordan 26.7)



Source: Faostat

Last Updated: April 23, 2023

Poultry meat consumption per capita in Iraq.

White meat from the breast with the skin removed is a very **lean cut**. Poultry products are especially lean compared to other animal products, such as pork or beef.

Turkey was once thought to be solely a holiday product that was in demand only a few times in a year. The turkey industry is now a booming business that offers more than the conventional whole bird.

Consumer interest in natural or **organic products** is increasing at a fast rate and has contributed to the increase in poultry consumption. Some consumers believe that natural or organic products have a superb quality, far above that of traditional products.

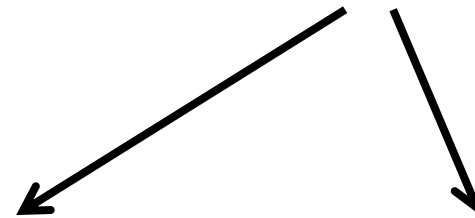
Many poultry producers have met consumer needs by producing new products, such as **antibiotic- or hormone-free** meat.

Another side of which some consumers are conscious is whether or not birds are raised by the **free-range method** or by more traditional means.

Many retail packages have the “free range” claim right on the product. There are many criteria that drive a consumer decision to purchase certain products, including appearance, **taste, aroma, and texture.**

◎ The Products

Poultry converts the nutrients in low value feedstuffs into high value meat and eggs. Both these poultry products are:



- ◎ Palatable
- ◎ Easily digestible
- ◎ Easily marketed

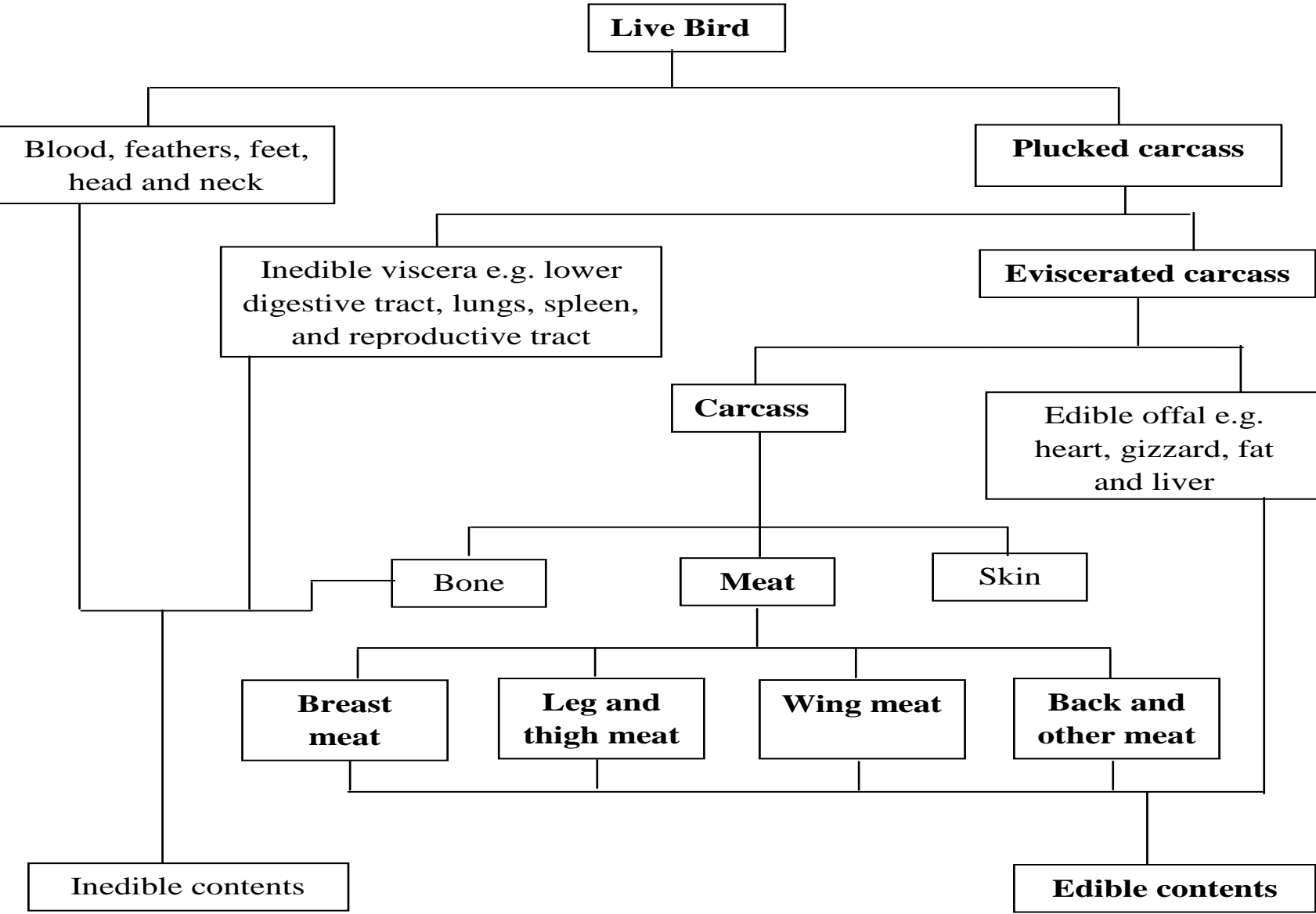


Fig. 1: The contents of a poultry carcass

SENSORY ATTRIBUTES OF POULTRY PRODUCTS

Color Characteristics

Color is a very important quality attribute considered by consumers when choosing a meat product. Poultry skin and muscle color are affected by a variety of factors, including age, and diet



The more a muscle is used, the more myoglobin is present in the muscle

Dark meat

light meat

Wheat diets tended to have breast fillets that were lighter in color

Milo seed diets tended to have fillets that were more **red**

Corn diets tended to have breast fillets that were slightly **yellow** in color.

Another important factor affecting color is the pH of the meat. Lower pH levels in the muscle are associated with **lower water-holding capacity**, due to alterations in the structure of **myofibrils** within the muscle when in a low-pH environment. If a muscle can hold more water, it typically will be lighter in color

If the pH of the muscle declines rapidly while the temperature of the carcass is still high, there will be **protein denaturation** in the muscle fibrils, causing the meat to be pale. This defect, known as pale, soft, and exudative (PSE) meat, is a growing problem in the turkey and poultry industry

As chickens and other animals **age**, the level of myoglobin in the muscle increases, resulting in darker colors

Color measurement: color of breast is measured by using color flex spectrophotometer, the result will be exposed as : Lightness (L^*) Redness (a^*) Yellowness (b^*)

	S	T	U	V	W	X	Y
1			Colour	Series 1	0 L*	0 a*	0 b*
2				Max Tolerance	0	0	0
3				Min Tolerance	0	0	0
4				111	52.95	6.01	17.72
5				112	53.17	5.93	17.09
6				113	52.43	6.07	17.04
7				114	55.16	5.61	17.05
8				115	55.26	5.72	17.18
9				116	55.01	5.63	18.06

Flavor and Aroma Characteristics

Raw meat has a bloody, metallic, salty taste, with an aroma resembling blood serum. The flavor is changed drastically once cooked.

Flavor develops during cooking through complex reactions between components found in raw meat combining with heat. The primary components of flavor may include reducing and phosphorylated sugars, amino acids, thiamine, and lipids

Several of the compounds contributing to aroma and flavor have been isolated and identified

Ribose may be the most important compound in chicken aroma

Thiamine has also been shown to be an important precursor of a wide range of sulfur compounds

The **diet** source of the bird has a noticeable effect on the flavor of broiler breast meat. Three diets with different primary carbohydrate sources (corn, milo, and wheat) were fed to 28-day-old broilers in a study. The birds were processed between 42 and 52 days of age, and the breasts were removed and frozen

Meat from birds fed corn, however, scored significantly higher for both than meat from birds fed milo or wheat.

استمارة درجات التقييم الحسي لعينات اللحم

عمر المقيم :.....

رقم العينة :.....

جنس المقيم :.....

تاريخ التقييم :.....

JUICINESS
8 Extremely Juicy
7 Very Juicy
6 Moderately Juicy
5 Slightly Juicy
4 Slightly Dry
3 Moderately Dry
2 Very Dry
1 Extremely Dry

FLAVOR INTENSITY
8 Extremely Intense
7 Very Intense
6 Moderately Intense
5 Slightly Intense
4 Slightly Bland
3 Moderately Bland
2 Very Bland
1 Extremely Bland

القبول العام	الطعم	الرائحة	العصيرية	الطراوة	الدرجة
مرفوضة	طعم غير مقبولة	رائحة غير مقبولة	جاف	صلب	1
مقبولة نوعاً ما	طعم قليلة	رائحة قليلة	عصيرية قليلة	طراوة قليلة	2
متوسطة القبول	طعم متوسطة	رائحة متوسطة	متوسط العصيرية	متوسط الطراوة	3
مقبولة	طعم جيدة	رائحة جيدة	عصيري	طري	4
مقبول جداً	طعم جيدة جداً	رائحة جيدة جداً	عصيري جداً	طري جداً	5



Muscle pH

pH is commonly used as an indicator of meat quality. As rigor mortis develops within the cell after slaughtering, ATP concentration declines and lactic acid begins to be built up due to glycolysis, thus decreasing the overall pH of the muscle.

A rapid pH decline may cause **protein denaturation**, resulting in a **decrease in tenderness and juiciness** as well as a less intense (pale) color of the muscle



pH meter

Texture Properties

Acceptance of meat is driven by several factors, texture, particularly **tenderness**, being one of the most important

Many factors influence the ultimate tenderness of broiler breast meat including age, sex, location, cooking method and pH

A rapid postmortem drop in pH has been found to cause a decrease in tenderness due to the changes in solubility of the protein and changes to the enzymes within the meat after slaughter.

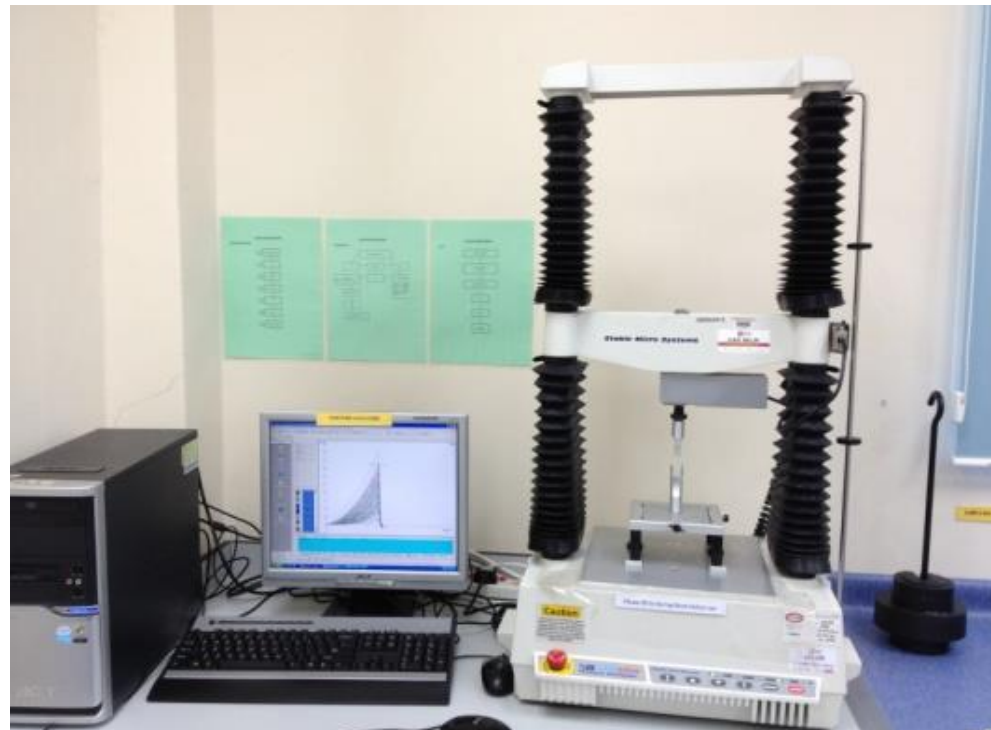
A decreased pH leads to a decreased activity of calpains and Cathepsins, enzymes that break down the protein structure and reduces postmortem tenderization causing toughening of the meat.

As meat ages, it tends to become tough. Tenderness decreases with age, due to the nonenzymatic glycosylation of tissue protein. During glycosylation, saccharides are added to proteins present in the muscle.

This contributes to the formation of cross-links leading to the **deterioration of collagen**. Over time there is an accumulation of these cross-links, which contributes to the toughness of meat from aged animals

Some argue that birds with **outdoor** access will produce **tougher** meat as a result of the increased mobility, and others believe that there is no difference in texture compared to conventional birds

Warner Bratzler



Factors that Affect Poultry Tenderness

1. Birds that struggle before or during slaughter cause rigor to set in to quickly (high temperatures and warmer seasons increase the risks of heat stress, which induce the occurrence of PSE).

However, an elevated growing-finishing environmental temperature before slaughter was shown to decrease glycolytic potential and to alter biochemical and histochemical characteristics, leading to a darker meat color (L^* -value reduced)

2. High pre-slaughter stunning temperatures
3. High scalding (boiling) temperatures
4. Longer scalding times
5. Machine picking
6. Feed additives influence tenderness.

Water-Holding Capacity and Cooking Loss

Cooking loss is a very important characteristic for the processing industry as water retention is a main point of profit. The main determinants of water-holding capacity of meat are pH and protein denaturation. The isoelectric point of the major water binding protein, myosin is 5.1-5.3.

Since decreased water holding capacity is one indicator of PSE meat, researchers have used drip loss and water holding capacity along with L* values and pH decline as characteristics to evaluate meat quality.

A high L* value and a low ultimate pH ($5.7 <$) have been found to be indicative of broiler breast meat that was both pale in color and low water-holding capacity.



Vacuum and seal machine



Water bath