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# PIC Quality Measurement Equipment and Procedures

# pH Measurement

# pH Meter Comparison



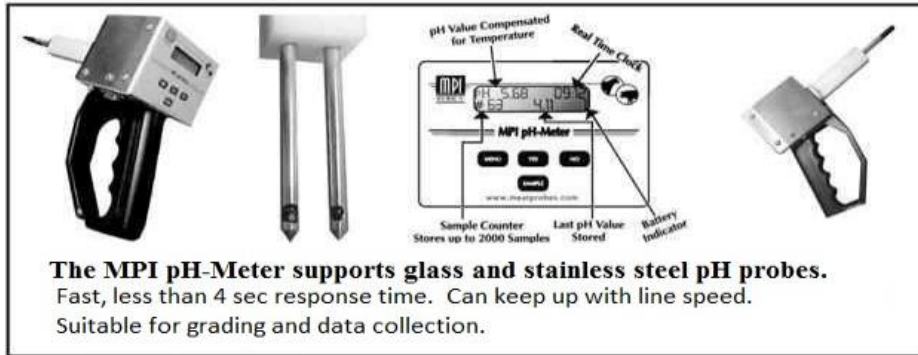
Item	MPI	Hanna HI98161	Hanna HI9810362
Cost, USD	≈ \$4,500	\$600	\$150
Temperature compensation	Manual	Both	Both
Measurement speed	< 5 sec	< 5 sec	< 5 sec
One piece	Yes	No	Yes
Sample logging	Yes	Yes	Yes
Logged sample capacity	> 1000	200	>1000
Probe type	Glass	Glass	Glass
Replacement probe cost, USD	\$250	\$175	\$150**

# MPI pH-Meter

<http://www.meatprobes.com/>



MPI pH-Meter  
Topeka, Kansas USA  
Tel. 785-266-9328  
Email: [meatprobes@gmail.com](mailto:meatprobes@gmail.com)



**The MPI pH-Meter supports glass and stainless steel pH probes.**  
Fast, less than 4 sec response time. Can keep up with line speed.  
Suitable for grading and data collection.

- Manual temperature compensation with fast response times.
- Designed for use in the meat industry.
- Ability to log and download 1000's of pH readings.
- May be difficult to order outside the U.S.
- Meter Price ≈ \$4,500 USD



# Hanna Instruments



Find your nearest HANNA office:

- |           |             |                |
|-----------|-------------|----------------|
| Argentina | Greece      | Romania        |
| Australia | Guatemala   | Serbia         |
| Austria   | Hungary     | Singapore      |
| Belgium   | India       | Slovenia       |
| Brazil    | Indonesia   | South Africa   |
| Bolivia   | Italy       | South Korea    |
| Canada    | Japan       | Spain          |
| Chile     | Malaysia    | Taiwan         |
| China     | Mexico      | Thailand       |
| Croatia   | Morocco     | U.A.E.         |
| Egypt     | Netherlands | United Kingdom |
| France    | Poland      | United States  |
| Germany   | Portugal    | Vietnam        |



- Hanna provides numerous solutions for measuring pH in meat products.
- Web site to find your local Hanna office: <http://hannainst.com/find-my-hanna>

# Hanna Instruments

HI98161



**HI98161**  
Professional pH and Temperature  
Meter for Food Products



- Smart probe automatically compensates for temperature.
  - This may result in slower response times when measuring, but can set for manual temperature compensation to speed response times.
- Ability to log and download 200 pH readings.
- Meter Price ≈ \$600 USD

# HI98161 Accessories



HI7004/1L pH 4.01  
Calibration Solution (1  
L)

**\$16.00**



HI7007/1L pH 7.01  
Calibration Solution (1  
L)

**\$16.00**



HI70300M Electrode  
Storage Solution (230  
mL)

**\$12.00**



Foodcare pH Electrode for Dairy  
Products and Semi-Solid Foods with  
Quick Connect DIN Connector -  
FC2023

**\$175.00**

# Hanna Instruments

HI9810362



**HALO2 Wireless pH Tester for Meat**



- Automatic or manual temperature compensation.
- Display values on the screen while Bluetooth connection allows data logging onto mobile devices.
- Removable plastic sleeves for quick cleaning and change of electrolytes.
  - Sleeve may fall off if the connection site gets too greasy.
- Meter price: ~\$150 USD



# HI9810362 Accessories

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HI7004/1L pH 4.01  
Calibration Solution (1  
L)

\$16.00



HI9071  
Gelled Bridge Electrolyte

\$19.00



HI700601P  
General Purpose Cleaning Solution (25 x 20 mL Sachets) \$29.00



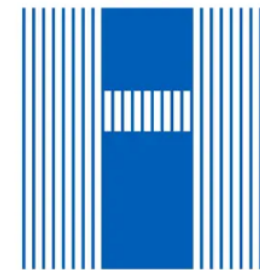
HI7007/1L pH 7.01  
Calibration Solution (1  
L)

\$16.00



HI70300M Electrode  
Storage Solution (230  
mL)

\$12.00



**Hanna Lab** 4+

Hanna Instruments

Designed for iPad

★★★★★ 4.8 • 4 Ratings

Free

# Temperature Measurement

# Temperature Measurement

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- Kizen Instant Read Thermometer
  - Fast measurement
  - ≈ \$22 USD on Amazon



 **ULTRA FAST**  
2-4 second Read Time

 **CLEAR**  
Bright LCD Screen

 **WATERPROOF**  
IP67 Rated Waterproof

 **CALIBRATION**  
Accuracy Ensured

# Temperature Measurement

- Cooper-Atkins DFP450W-0-8 Instant Read Thermometer
  - Fast measurement
  - \$30-40 USD on Amazon



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# Temperature Curve Measurement

- HOBO 4-Channel Analog Data Logger (PART# – MX1105)
  - Logger cost = \$210 USD from HOBO
  - Temperature probe (SD-TEMP-SS-06)
    - Cost = \$115 USD each
    - Need 3 per logger (ham, loin, shoulder)
  - Ambient temperature probe (SD-TEMP-06)
    - Cost = \$45 USD each
    - Need 1 per logger (hangs below carcass)
  - Loggers are not water-resistant and need to be placed into waterproof bags. Fix bag/logger to carcass with shroud pin. Flagging tape can be used to easily identify and keep track of carcasses throughout chilling. Bags (≈ \$10 USD) and flagging tape (≈ \$5 USD) can be found on Amazon.
  - Bluetooth connection allows logger configuration, data collection, and download on mobile devices.



Home / Products / MX1105



**HOBObconnect** 4+  
Onset Computer Corporation  
★★★★★ 2.7 • 13 Ratings  
Free



# Measure pH and Temperature Curve Data Simultaneously

# Data Logger

## REED R3000SD Data Logging pH/ORP Meter

- Record pH and temperature curve data simultaneously
- Data stored in SD card
- Allow both manual and automatic recording at a rate from 1 to 3600 seconds
- Price: ~\$230 USD from REED



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# Probes

- Temperature probe
  - REED R3000SD-ATC
  - Price: ~\$60 USD from REED
- pH probe
  - HANNA FC200B
  - Price: ~\$220 USD from HANNA





# Color Measurement

# Japanese Color Score



- Subjective color measurement (1 to 6)
- Available from Hamukumi in Japan ([PCS / BCS » Japan Ham and Sausage Industry Cooperative \(hamukumi.or.jp\)](http://PCS / BCS » Japan Ham and Sausage Industry Cooperative (hamukumi.or.jp))))
- Must have someone in Japan who facilitates the payments and speaks Japanese.
- Price: ~\$150 USD



# Minolta L\*a\*b\*

- Objective measure of color.
- Minolta CR400
- L\* = darkness of the meat
  - Low number is darker and high number is light colored
- a\* = redness
- b\* = yellowness
- Quick, reliable, consistent measure of color.
- Approximate cost of \$5000 to \$8000 USD.

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# Procedures for Collecting Measurements

# Collecting Temperature Decline Curves and Hand Temperatures

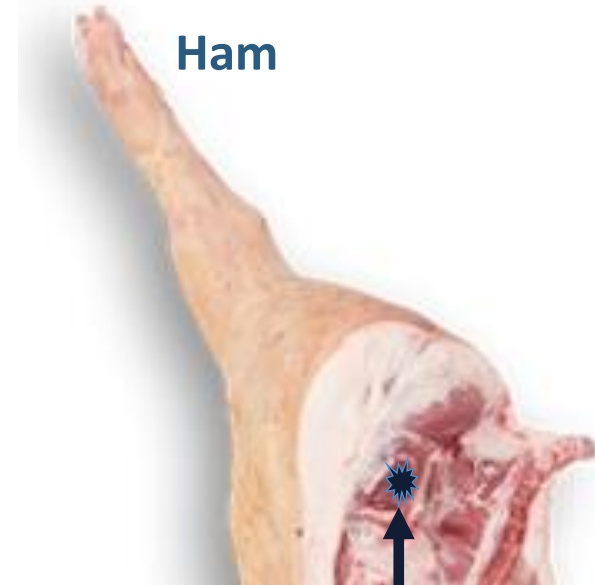


Ambient 

Loin



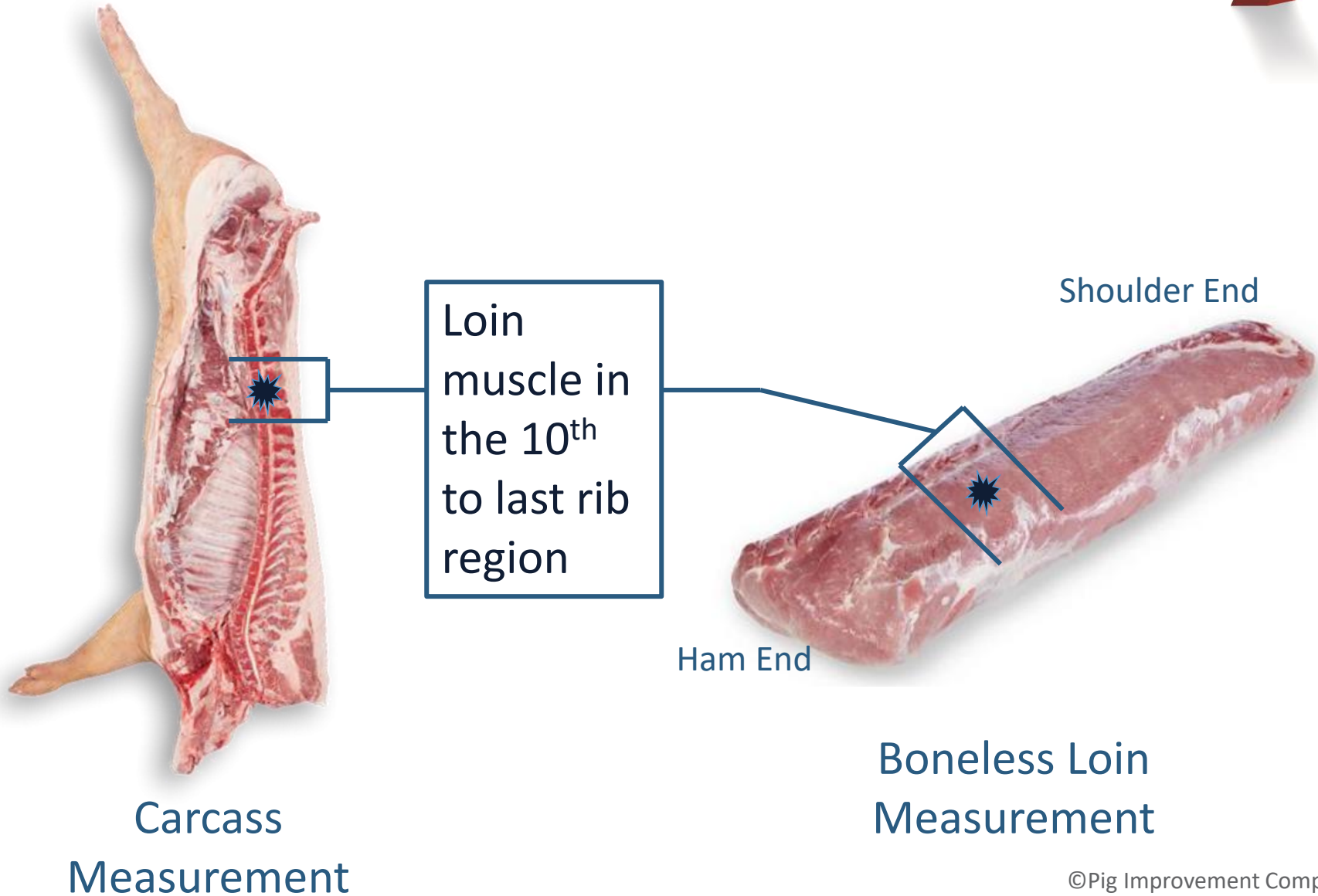
Ham



Shoulder



# Loin pH Measurement

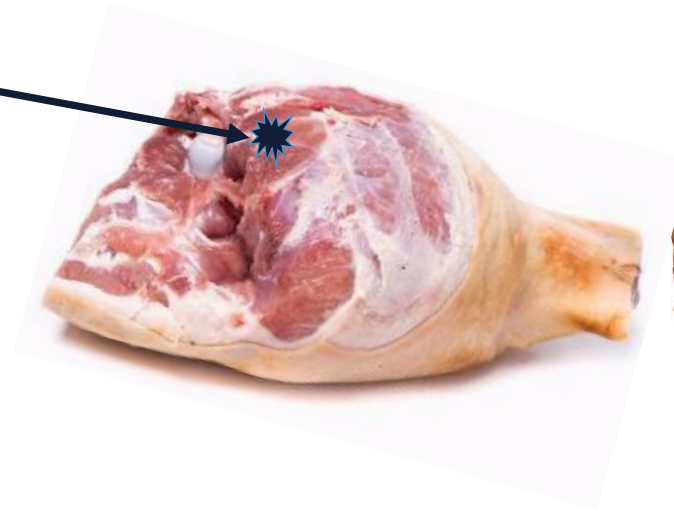


# Ham pH Measurement

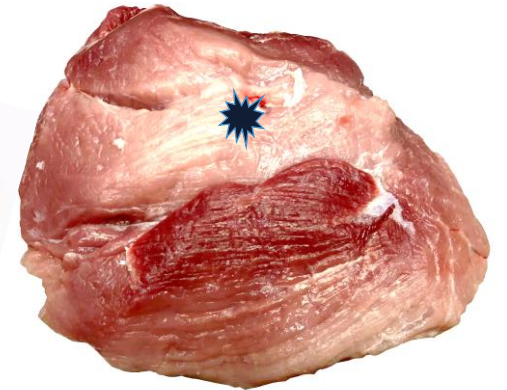
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Carcass  
Measurement



Bone-in Ham  
Measurement



Boneless Ham  
Measurement

# Boneless Loin Quality Measurement

Ham End



## JCS Average

Score the average color in this area.



## JCS Shoulder

Score the lightest color in this area.

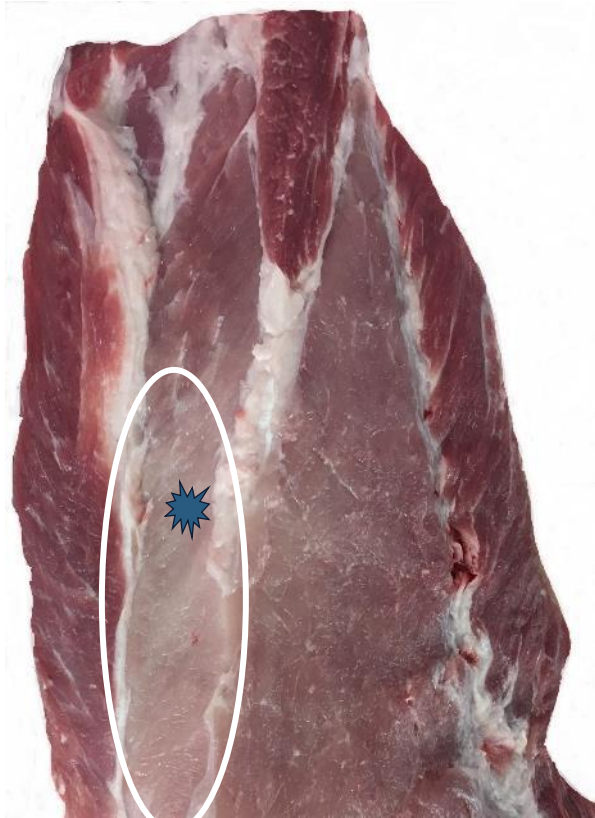


Shoulder End



# Examples of Pale Color on Shoulder

Pale color – small area



Pale color – large area



No pale color

