



# **AUS-MEAT ACFM PROGRAM**

**ADVANCED CARCASS FAT MEASUREMENT  
(ACFM)**

**- BOVINE P8 -**

**PARTICIPANTS WORKBOOK**

JANUARY 2000

# Table of Contents

- 1 Objectives of the course
- 2 Glossary of Terms
- 3 Beef Carcase Fat Measurement
  - 3.1 Why measure carcase fat depth?
  - 3.2 Why have one standard?
  - 3.3 Why Measure at the P8 site?
- 4 Location of the P8 site
  - 4.1 Definition of the P8 site
  - 4.2 Finding the P8 site
- 5 Instruments for Measuring the P8 fat depth
  - 5.1 The Cut and Measure Knife
  - 5.2 The Hennessy Grading Probe
- 6 Cut and Measure Knife
  - 6.1 Parts of the Cut and Measure Knife
  - 6.2 Workstation
  - 6.3 Pre-operational check
  - 6.4 Operation of the Cut and Measure Knife
- 7 Hennessy Grading Probe (HGP)
  - 7.1 Parts of the HGP
  - 7.2 Pre-operational check
  - 7.3 Calibration
  - 7.4 Operation of the HGP
  - 7.5 Reading the HGP display
  - 7.6 Linking up with SAS Intern III
  - 7.7 Cancelling measurements
  - 7.8 Routine maintenance
- 8 Monitoring P8 Fat Depth Measurements
  - 8.1 Accuracy
  - 8.2 Auditing procedure
- 9 Troubleshooting
  - 9.1 Damaged sites
  - 9.2 Causes of errors – Cut and Measure Knife
  - 9.3 Causes of errors – HGP
- 10 Pricing Systems

# 1. OBJECTIVES OF THE COURSE

The objective of this course is to improve your understanding of the importance of carcass fat measurement and to improve your carcass fat measurement skills.

At the completion of this course you should be able to:

- ✓ Explain the importance of accurate P8 measurements.
- ✓ Define and locate the P8 site.
- ✓ Take P8 measurements that are within the performance standard.
- ✓ Understand the P8 measurement monitoring process.
- ✓ Explain possible causes of carcass fat measurement error.



The ACFM-Bovine examination comprises of a multiple choice section, a demonstration of your pre-operational check of measuring instruments, P8 site location, and carcass measurement. The answers to the multiple-choice section are contained in this workbook.

## 2. Glossary of Terms

“**Alphanumeric**” means a combination of letters and numbers.

“**Cartilage**” means the flexible portion of bone usually found at the end of the bone, prominent in young animals.

“**Caudal**” means towards the tail end of the carcass.

“**Dorsal**” means towards the back of the carcass.

“**HSCW**” means the Hot Standard Carcass Weight, the weight of a carcass when trimmed to the defined standard and weighed within 2 hours of slaughter with no deductions for shrinkage.

“**Lateral**” means away from the midline towards the side of the carcass.

“**Ligament**” means the elastic or fibrous connective tissue attaching bone to bone.

“**Linear**” means a measurement of length.

“**Medial**” means towards the midline of the carcass.

“**Numeric**” means numbers.

“**Objective**” means existing independently of perception, emotion or personal bias.

“**Parallax**” means an apparent change in the position of an object resulting from a change in the position of the observer.

“**Parallel**” means separated by an equal distance at every point never touching and never intersecting.

“**Perpendicular**” means at right angles (90 degrees).

“**Regression**” means the measure of the association between one variable (the dependent) and other variables (independent).

“**Sawn Chine**” means sawn surface of the split vertebral column.

“**Subjective**” means an assessment based on a person's experience, emotions and personal bias.

“**Tendon**” means the white connective tissue, which attaches muscle to bone.

“**Ventral**” means towards the belly or lower side of the carcass.

### **3. BEEF CARCASE FAT MEASUREMENT**

#### **3.1 Why Measure Carcass Fat Depth?**

The two key factors in determining the value of a carcass are:

- ▶▶ Market destination, and
- \$\$ The yield of saleable meat from the carcass.

The suitability of a carcass for a particular market will be determined by consumer preferences in that market. The P8 measurement is one objective measurement that is used to determine the destination of the carcass.

Destination usually refers to the country the carcass will go to and its market segment in that country. It also applies to the domestic market where retail outlets are being encouraged to include carcass fat scores or millimetre ranges in their purchasing specifications.

A carcass which yields a higher percentage of saleable meat is generally more valuable.

An accurate measurement of carcass fat depth will indicate the yield of the carcass and its suitability for a particular market. Research results support this claim and indicate that P8 measurements can provide useful data for plant management, the producer and the end-user. This information is used, not only as a means of determining payment to producers, but also as a management tool for the processor and producer.

#### **3.2 Why have one standard?**

A national carcass fat measurement site makes a lot of sense for the following reasons:

- ◆ It provides objective producer feedback that can be compared between meatworks and mobs of Cattle. Feedback aids livestock production management.
- ◆ It provides a reliable indicator to abattoir management of the market suitability and the saleable meat yield of carcasses.
- ◆ It provides an objective basis for establishing the prices paid for stock purchased 'over the hooks'.
- ◆ It provides livestock buyers with an objective yardstick to compare their live animal assessment.
- ◆ It provides carcass buyers with an objective means of specifying the desired fat depth range.

### 3.3 Why measure at the P8 Site

Although fat depth has in the past been measured over the 12/13<sup>th</sup> rib, it was subsequently discovered that dressing damage, particularly with the hide puller, made this site a less reliable indicator of carcass fat depth.

Research into alternative sites for measurement of fat depth recommended that the **P8** site is less susceptible to damage by the hide puller. It was also found that the demarcation between muscle and fat is more distinct at the **P8** site making measurements with electronic devices more reliable.

## 4. LOCATION OF THE P8 SITE

### 4.1 Definition of the P8 Site

The P8 site is a point defined by the following anatomical description.

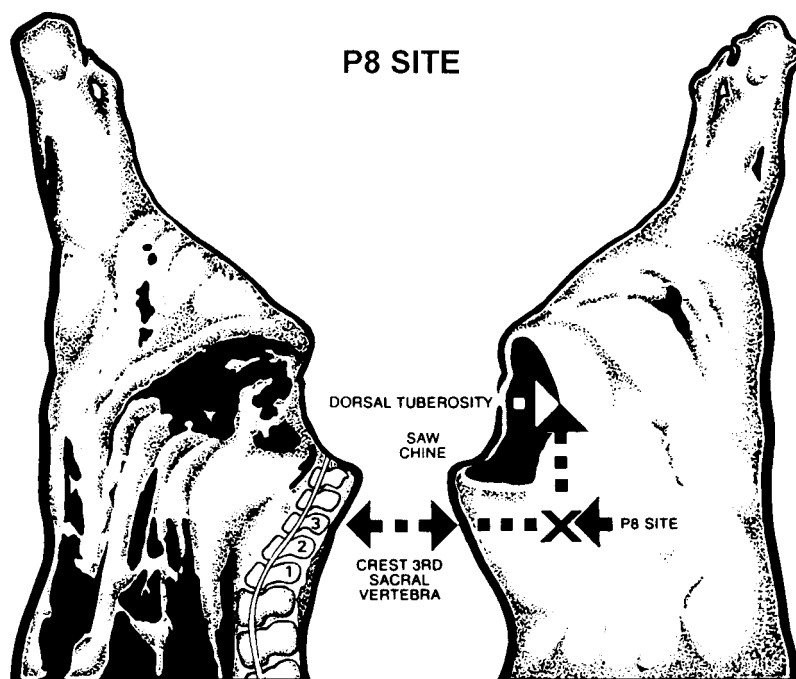
The point of intersection of a line from the dorsal tuberosity of the tripartite tuber ischii parallel with the chine, and a line at 90° to the sawn chine centred on the crest of the spinous process of the third sacral vertebra.

This means (in layman's terms) The P8 site is defined as the point of the intersection of;

A line drawn from the center of where the ligament forming the channel rim joins the pin bone, parallel with the sawn chine.

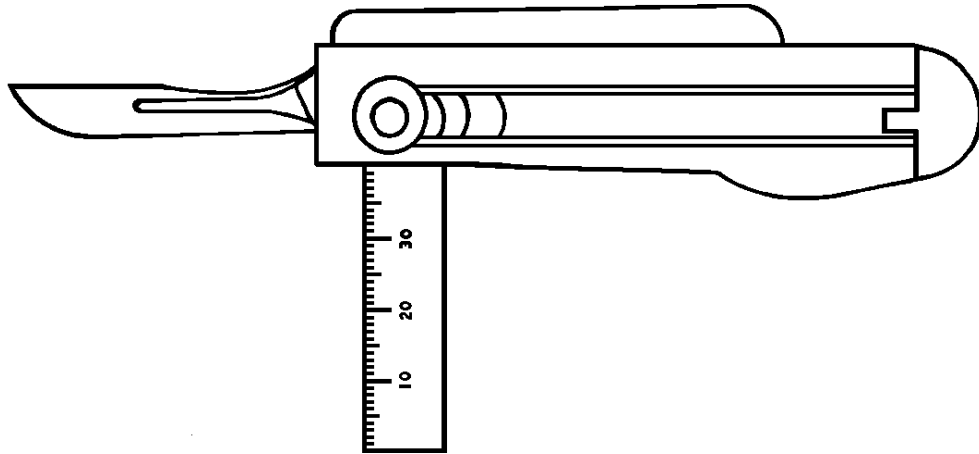
And a line centered in the crest of the third sacral vertebrae drawn at 90 degrees to the sawn chine.

### 4.2 Finding the P8 site

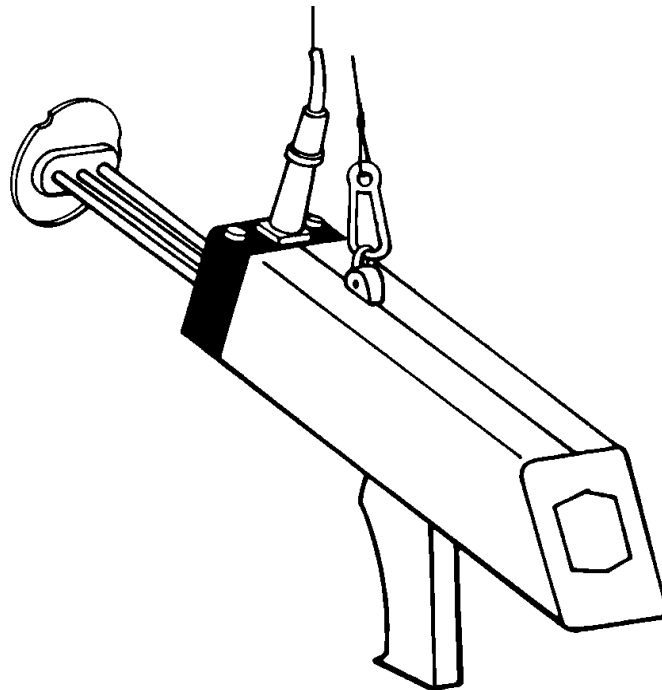


## 5 INSTRUMENTS FOR MEASURING THE P8 SITE

There are two instruments approved for use in Australia for taking the P8 measurement. The first is called the Cut and Measure Knife.

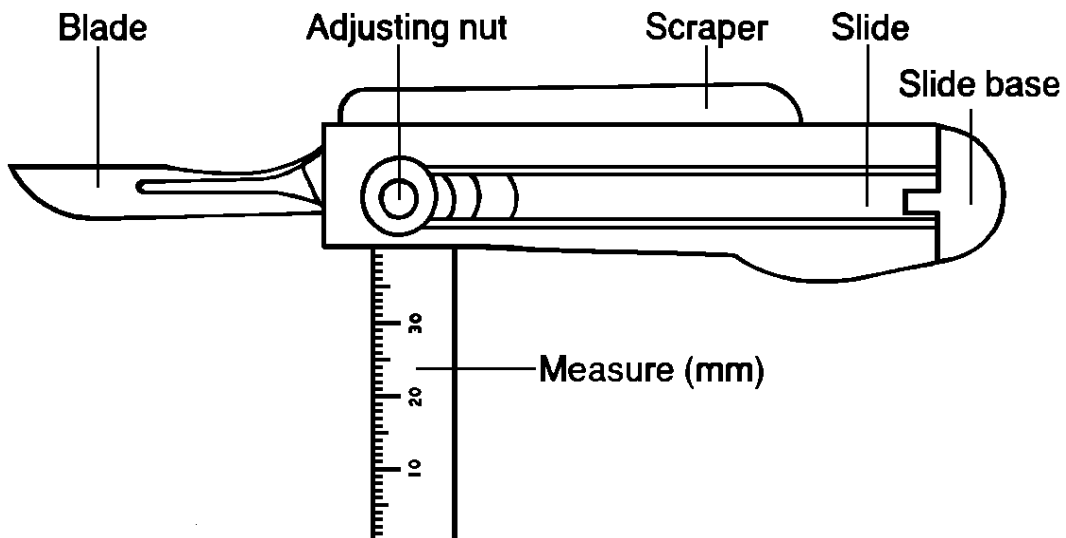


The second called the Hennessy Grading Probe was developed in both New Zealand and Australia.



## 6. CUT AND MEASURE KNIFE

### 6.1 Parts of the Cut and Measure Knife



### 6.2 Work Station

The operator who performs this task must be comfortable while working otherwise his/her level of accuracy will suffer. Points to consider for the workstation are as follows:

- ◆ **Height** of work platform. The platform must be designed so that the measurer neither has to squat or to reach to read the ruler. The measurer should be at eye level with the sacral region.
- ◆ **Lighting.** A lighting intensity of 440 lux is recommended, some operators may find it helpful to have more lighting available.
- ◆ **Humidity.** This is particularly important to measurers who wear spectacles in the performance of their task. The supply of additional air movements may help overcome fogging problems. Failure to cope with this problem may result in measurers not wearing spectacles when taking measurements and this may affect their level of performance.
- ◆ **Reach.** The work platform should be positioned so that the measurer is as close as possible to the site. The platform should be of sufficient length to allow for rechecking of measurements or measurement of the alternative side when damage occurs to the fat selvedge.

### 6.3 Pre-operational check

Before using the Cut and Measure Knife a check should be conducted of the following:

- ◆ The Cut and Measure Knife should be clean, it is important that the measure can be read accurately.
- ◆ The measure must be checked to ensure that it is not damaged e.g. worn or split, as inaccurate measurements can occur.
- ◆ The blade must be sharp. Care is needed when fitting new blades, it is recommended that the point of the blade be kept in the packet until securely fitted. The old blade should be carefully disposed of.
- ◆ It is a recommended safe practice to always ensure that the slide base is intact prior to use. The slide base can be glued in.

### 6.4 Operation of the Cut and Measure Knife

- 1 Steady the carcass using the free hand and place the thumb on the crest of the spinous process of the third sacral vertebra as a guide for finding the sacral crest.
- 2 Draw an imaginary line commencing from the dorsal tuberosity. The intersection of this with an imaginary line from the crest of the third sacral vertebra is the **P8** site.
- 3 Cut vertically through the subcutaneous fat ensuring that the cut is as far as, but not further than the silver fascia lying between the fat and the muscle tissue. The cut should be no longer than 30 mm to avoid errors and damage to the rump.
- 4 Continue to hold the carcass with the thumb on the crest of the third sacral vertebra, position the side so that the sawn surface of the chine is facing the measurer. Now insert the ruler of the cut and measure knife into the cut, ensuring that the bottom of the ruler is firmly on the silver fascia without depressing the muscle tissue. Hold the ruler against the cut fat surface close to the measurer and read the fat depth taking care to avoid parallax errors.

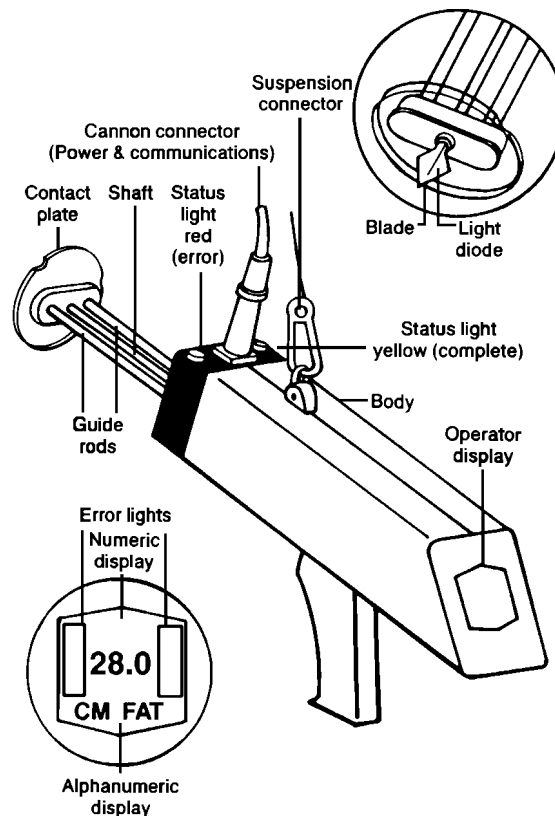
## 7. HENNESSY GRADING PROBE (HGP)

The Hennessy Grading Probe (HGP) measures fat depth by recording fat depth at which changes of intensity of reflected light are caused by the different reflectivity of fat and meat. There is a light source and sensor mounted in the tip of the probe shaft. The fat depth measurement is calculated by measuring the distance the light source and sensor travel relative to the surface of the carcass. This distance is translated to give an equivalent to cut and measure fat depth in millimetres. This reading can then be automatically recorded by computer.

Extensive trials, conducted on hot beef carcasses, have shown good relationships between measurements taken with the HGP and cut and measure techniques. Even so, the HGP shows a tendency to over and under estimate the fat depth on lean and fat carcasses respectively. This resulted in a regression table being fitted to the HGP to modify its measurements so that they approximate measurements taken by Cut and Measure.

Because of this equation, at each operation the probe displays two readings, the first is a regressive reading and makes the variable adjustment between the HGP and what the Cut and Measure would have read. This is the fat depth measurement which is recorded. The second is a linear reading, this is the HGP's measurement without the variable adjustment. This is the measurement used when checking the calibration on the test block.

### 7.1 Parts of the Hennessy Grading Probe



## 7.2 Pre-operational Check

Contact plate should be fully depressed before attempting to remove.

Contact plate must be checked to ensure it is screwed home (hand tight, not over tightened) and correctly fitted.

Light source Diode must be checked to ensure that it is obstruction free.

Blade is sharp both front and back and is secure.

- ◆ Probe is clean and no fat around guide rods,
- ◆ Guide rods must move freely,
- ◆ Electronic connection is locked tight, and
- ◆ Alcohol is available to clean probe regularly.

## 7.3 Calibration

Every run the probe should be calibrated against the test block. Pre-operation Calibration checks should be logged and details should include:

- ◆ Date and time,
- ◆ Calibration result, and
- ◆ Name and signature of checker.

If the grading probe does not measure correctly to +/- 0.4 mm, management must withdraw the HGP from use and send it for servicing and re-calibration.

To check the probe use the test block.

Probe 10 mm display shows Millimetres CM FAT\*; tilt probe 90 degrees to right; display shows 10.0 1 FAT\*\*

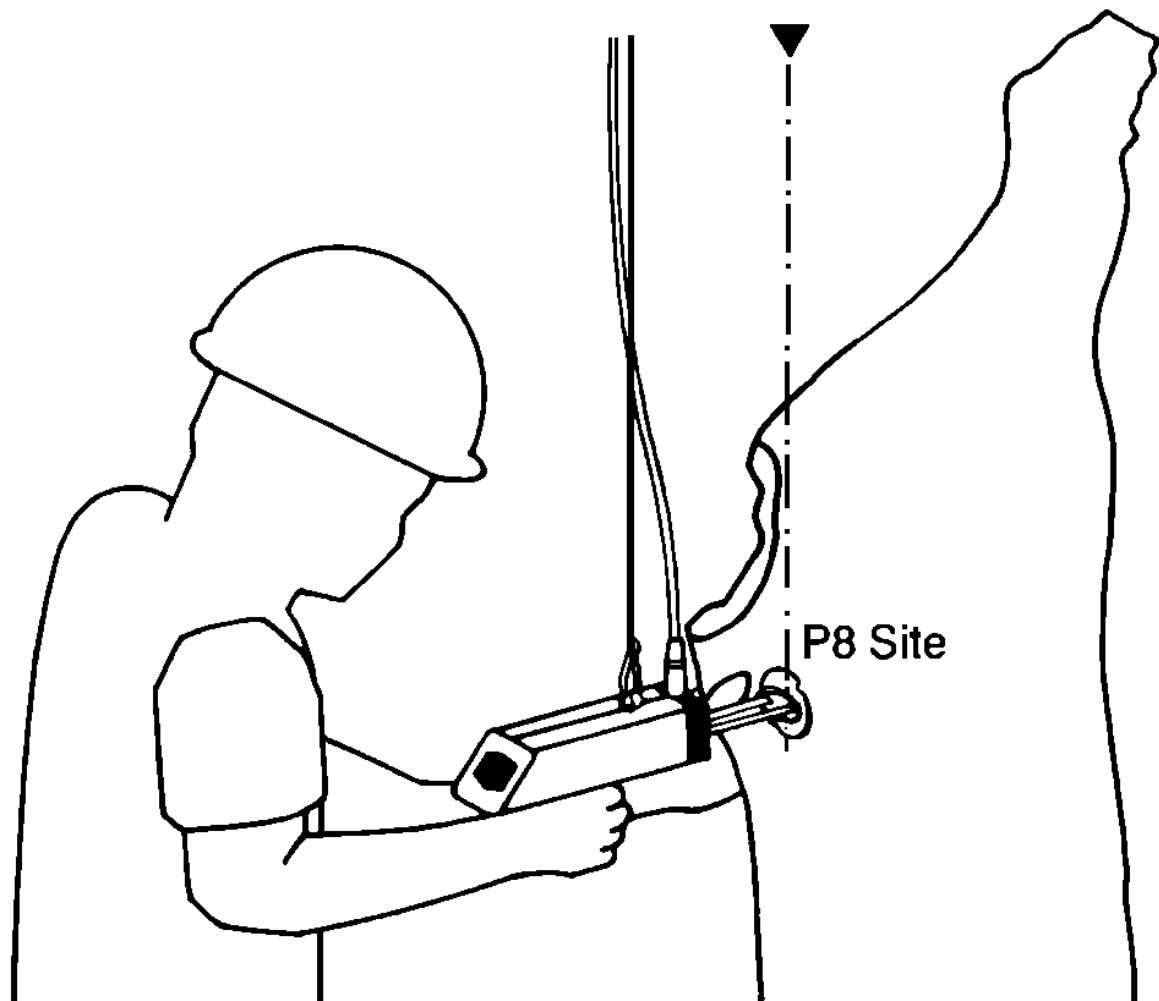
Probe 20 mm display shows Millimetres CM FAT\*; tilt probe 90 degrees to right; display shows 20.0 1 FAT\*\*

\* Millimetres CM FAT; This is called the Regressive reading. It is an adjusted measurement, which relates with the Cut and Measure measurement.

\*\* 1 FAT; This is called the linear measurement. It relates to the actual distance travelled by the light source on the probe.

## 7.4 Operation of the HGP

- 1 Steady the carcass using the free hand and place the thumb on the crest of the spinous process of the third sacral vertebra as a guide for finding the sacral crest.
- 2 Draw an imaginary line commencing from the dorsal tuberosity, the intersection of this with an imaginary line from the crest of the third sacral vertebra is the **P8** site.
- 3 Hold the HGP horizontally and insert the probe shaft fully ensuring it is held perpendicular to the carcass surface, and the contact plate is flat against the carcass surface.
- 4 Smoothly withdraw the probe completely from the carcass ensuring the contact plate remains flat against the surface.
- 5 Withdrawal at excessive speeds may cause the probe to indicate an error, if so the measurement should be repeated at a site immediately adjacent to the previous insertion site, within a 10-mm radius of the correct site.



## 7.5 Reading the HGP Display

The Beef HGP displays two measurements, these are;

- FAT DEPTH: Equivalent to Cut and Measure (Regressive Reading)
- LINEAR READING: Actual distance travelled

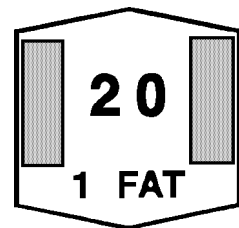
### Fat Depth

The grading probe displays the fat content on the numeric display, and the particular measurement taken on the Alphanumeric display.



### Linear Reading

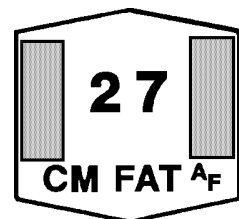
If tilted to the right the distance travelled measurement will be displayed.



### Finish Indicator

At the completion of the sequence the yellow status light is turned on and simultaneously the Alphanumeric display reads an "all finished" condition.

The probe is now ready for the next carcass.

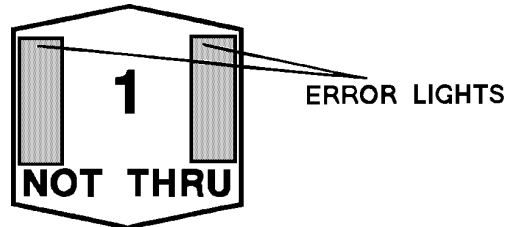


The "all finished" condition occurs 5 seconds after the completion of an error free measurement or the last tilt of the probe.

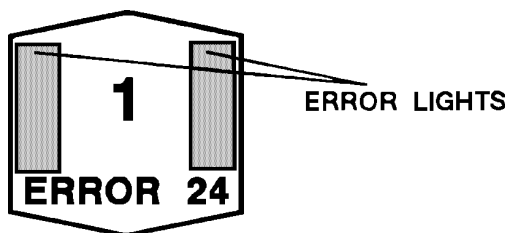
If the display has gone blank, the first tilt to the right will recall the last reading that was present prior to the display turning off.

## Incorrect Measurements

If an incorrect measurement is made or an error is detected by the HGP the red status light flashes simultaneously with the error lights on either end of the numeric display. An error message will be displayed, e.g.



If tilted to the right, an error number will be displayed, e.g.



Error number descriptions are available in the “Hennessy Grading Systems” training manual.

It is recommended that operators routinely compare the displayed Fat Depth reading with a visual estimate of the fat depth (if possible). This practice may assist in reducing obvious discrepancies.

## 7.6 Link-up with SAS Intern III

A buffer of 10 readings is provided for input from the HGP allowing probe operation to be positioned up to 10 carcasses ahead of the scales. When the Intern is first switched on the message window in the probe displays “INTERM?”.

If the HGP was switched on before the Intern, “Hello Scales and System Intern” will be displayed while the Intern operator keys in the date and time.

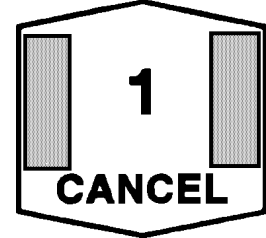
The probe operator must wait (“PLS WAIT” displayed in window) until the Intern operator has finished entering the time and date and is ready to accept readings from the HGP. When “PROCEED” is displayed in the window the operator can commence probing.

If the probe operator attempts to enter more than 10 readings before the Intern operator, “PLS WAIT” will be displayed. “PROCEED” will be displayed when the Intern is ready to receive another measurement from the HGP.

## 7.7 Cancelling Measurements

Readings are cancelled by tilting the HGP to the left within 5 seconds after completing a measurement. This time factor is extended if the operator examines the other measurements.

After cancelling, the red status light flashes simultaneously with the error lights on either side of the Numeric display. This message will be displayed:



The measurement must now be repeated.

If the HGP is being used with a data capture device such as Interm any cancellation by the operator will be transmitted to the computer.

It is important that an incorrect reading be cancelled immediately as transmission of the measurement from the HGP to the computer is effected within a very short time. The correlation of measurement reading to carcass number could be out and go unnoticed causing obvious problems.

## 7.8 Routine Maintenance

### 7.8.1 Cleaning and Storage

Probe must look and feel clean, be free from fat, grease, tissue, blood etc. Guide rods must move freely up and down the full length of the shaft.

The probe must be cleaned regularly using a soft cloth or paper tissue, soaked in Isopropyl Alcohol or similar approved edible degreasing agent. In large throughput plants the HGP should be cleaned every hour or earlier if problems are encountered.

The HGP is not Hose Proof and must never be hosed under any circumstances.

Every effort must be made to keep the HGP as dry as possible especially with storage at the end of the operation.

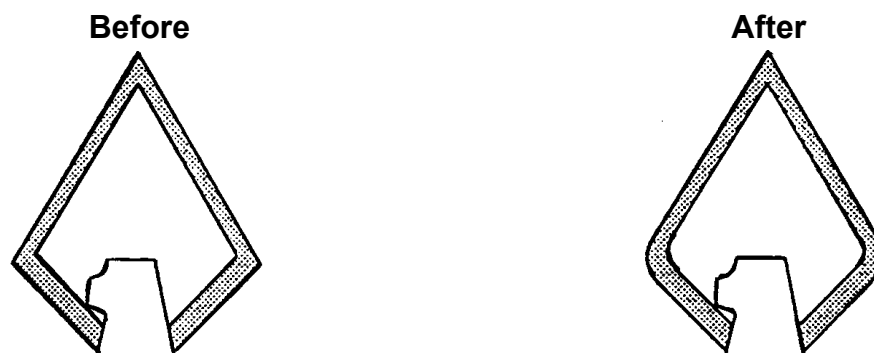
#### **At completion of use, check the following:**

- ◆ **Cleanliness:** Fully depress contact plate and unscrew. Thoroughly clean as mentioned previously.
- ◆ **Electrical Connections:** Thoroughly clean using approved edible degreasing solvent and oil with small amount of silicone oil. Cover with a sealed plug.

- ◆ **Lubrication:** At the completion of cleaning a single drop of silicone oil should be applied to the top and bottom of each guide rod, close to the probe body. The contact plate should be depressed several times to spread the silicone oil over the guide rods and down into the bearings. Use a paper towel to remove any excess oil.
- ◆ **Storage:** After the above procedure has been completed the probe must be placed in the carry case provided, and secured in a dry, warm place. Rapid changes in temperature, likely to cause condensation must be avoided.

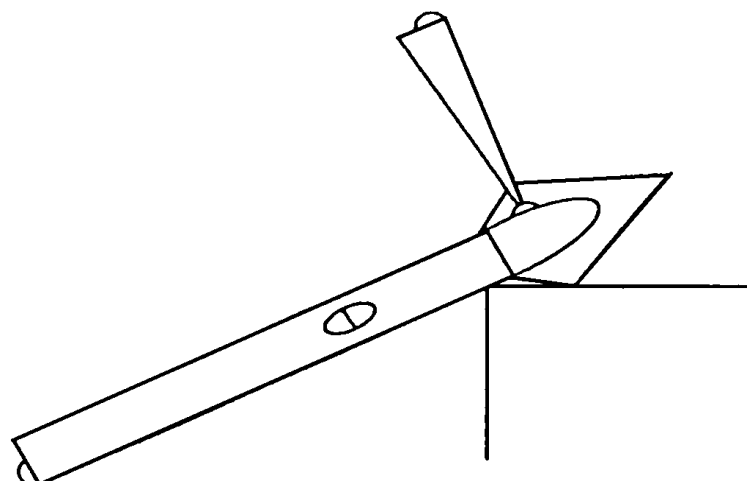
### 7.8.2 Sharpening

- ◆ The blade must be sharp both front and back.
- ◆ The blade must be removed for sharpening, using a small hand stone or wet stone. Both front and back should be kept Sharp and the latitudinal edges should be rounded off. A spare sharp blade should always be on hand.



### Changing the Blade

1. Press button on side of blade holder with tool provided.
2. Pull blade free with fingers
3. Replace blade by pushing home firmly.



### 7.8.3 SASTEK Maintenance

Operators **should not attempt** to make any adjustments or repairs to the HGP if faults are detected during usage or cleaning.

The alignment of the guide rods, which support the contact plate mounting bracket, is critical and must be checked for damage and correct alignment.

If the guide rods do not move freely, after the application of silicone oil the probe must not be used and should be sent to SASTEK for realignment.

**Adjustment without the appropriate tools can cause permanent and expensive damage to the equipment.**

## 8. MONITORING P8 FAT DEPTH MEASUREMENTS

### 8.1 Accuracy

To gain confidence in the accuracy and precision of measurements used commercially it is necessary to establish that the measurements comply with agreed objective performance standards.

**P8** fat depth measurements need to be regularly monitored by Company Standards Officers.

This monitoring is conducted at a frequency laid down in the Enterprises Quality Systems Manual and approved by AUS-MEAT. The results of the monitoring must be retained for inspection by AUS-MEAT during audit of the QA program.

The recommended sample size is as per AUS-MEAT National Accreditation Standards.

#### **Tolerances**

The industry accepted tolerances when conducting monitoring of fat depth are as follows;

<b>Fat Depth</b>	<b>Tolerance</b>
Up to and including 5 mm	+/- 1 mm
Over 5 mm and up to and including 10 mm	+/- 2 mm
Over 10 mm	+/- 3 mm

The check sheet below is an example of 20 carcasses checked by a standards officer (monitor).

CC No	Measurer mm	Monitor mm	Difference mm	Within Tolerance	Correct Site
1	14	14			✓
2	8	8			✓
3	10	12	-2		✓
4	9	8	+1		✓
5	14	13	+1		✓
6	5	6	-1		✓
7	13	13			✓
8	15	15			✓
9	25	20	+5	No	✗
10	19	18	+1		✓
11	19	20	-1		✓
12	7	10	-3	No	✗
13	8	8			✓
14	15	15			✓
15	10	10			✓
16	12	12			✓
17	19	20	-1		✓
18	22	20	+2		✓
19	14	14			✓
20	12	12			✓

## MONITORING P8 FAT DEPTH MEASUREMENTS

On the check sheet below calculate the difference.

CC No	Measurer mm	Monitor mm	Difference mm	Within Tolerance	Correct Site
1	14	13			
2	8	10			
3	10	9			
4	9	7			
5	14	16			
6	5	7			
7	13	9			
8	15	18			
9	25	22			
10	19	17			
11	19	21			
12	7	8			
13	8	7			
14	15	14			
15	10	15			
16	12	9			
17	19	19			
18	22	22			
19	14	15			
20	12	11			

## 8.2 Auditing Procedures

The AUS-MEAT Area Manager accompanies the QA Officer as he/she monitors P8 fat depth.

### 8.2.1 QA Officer's responsibilities

- ◆ ensure P8 recording is being carried out on all required carcasses,
- ◆ take a representative sample against which to assess accuracy of P8 measurement and to ensure this sample is random,
- ◆ ensure that the stand and equipment used is conducive to effective monitoring,
- ◆ ensure that the monitoring takes place in an appropriate (discrete) place, and
- ◆ pin the daily P8 sheet to the daily QA report sheet or as required by the Quality Systems Program.

### 8.2.2 QA Officer and on-line measurer's responsibilities

- ◆ correctly determine the **P8** site noting any inaccurate sites on the check sheet. If the **P8** site is damaged on one side of the carcass the **P8** measurement is taken on the second side if undamaged. A significantly damaged site must not be included in a sample,
- ◆ ensure that the measurement is viewed from the sawn chine side,
- ◆ ensure that the fat surfaces are not distorted by pressure from the hand on the measuring instrument,
- ◆ only make the cut as large as necessary,
- ◆ always go as deep as the muscle fascia but do not penetrate it, the QA Officer should note this if it occurs, and
- ◆ always look across the top of the fat surface at a true tangent to the steel rule to determine the fat depth.

All these points assume that the monitoring is carried out with a cut and measure knife. Most checks are equally relevant if the monitoring is done with a Hennessy Grading Probe. It is more important in the case of the HGP that the height of the operator's stand is correct to ensure that the contact plate is flat against the fat surface.

## 9 TROUBLESHOOTING

### 9.1 Damaged sites

As the accuracy of the measurement is critical to trading, the fat measurer must learn to allow for damage to the measurement side. The measurer must be able to recognise and allow for 6 types of damage.

- 1 Hide stripper damage will be easily recognised as lumps of fat torn off either the muscle or the remaining fat. The measurement should be taken at the nearest undamaged site.
2. Air knife damage can often go unnoticed as the surface is usually left with a smooth finish. As this type of damage is often quite extensive, especially in very fat animals, it can be difficult to find a suitable site within the prescribed radius of the P8 site. This damage should be recognisable from a “step down” of the fat usually level with the butt of the tail. If this is the case then an estimate of the original fat depth is necessary.
3. Bruising damage will probably have been trimmed off before coming to the measurement position. If the trimming extends beyond the accepted area around the P8 site an estimate is necessary. The same action applies to untrimmed bruising.
4. Excessive trimming should be easily recognised by the dips and wavy finish. If the trimmer has faced the fat over the rump a similar situation to (2) may arise.
- 5 Wavy finish to rump surface can also be the result of air knives being used to assist the hide stripper in which case it should be remembered that the 'crests' of the waves are more likely to represent the original fat depth. If this point is too far removed from the P8 site an estimate should be made.
6. A soft side which has been sawn off center resulting in an incomplete backbone on one side should be avoided where possible. When the other side has site damage the P8 site on the soft sided side must be used. The P8 site must be estimated.

NOTE: If a suitable site cannot be found within a radius of 10 mm of the true P8 site, then an estimate of the original fat depth is necessary.

## **9.2 Possible causes of error in measuring fat depth using the Cut and Measure Knife**

- ◆ Faulty instrument – damaged ruler
- ◆ Cut is too long – primal damage
- ◆ Cut is too deep – into silver fascia
- ◆ Ruler not at 90 degrees to silver fascia
- ◆ Parallax error when reading
- ◆ Indentation of ruler
- ◆ Cut not parallel to chine
- ◆ Incorrect fat surface read
- ◆ Moving ruler when reading
- ◆ Failure to smooth out fat surface
- ◆ Incorrect reading of ruler

## **9.3 Possible causes of error in measuring fat depth using the Hennessy Grading Probe**

- ◆ Faulty probe – guide rods, calibration
- ◆ Indentation
- ◆ Incorrect measuring action
- ◆ Holding contact plate with free hand
- ◆ Blunt blade front or back
- ◆ Not removing probe from carcass
- ◆ Dirty light diode
- ◆ Not canceling incorrect measurement within time limit – correlation
- ◆ Parallax error
- ◆ Contact plate not flat against carcass.

## 10 Pricing Systems

The importance of objective fat depth measurement in pricing systems for beef.

A pricing system of premiums and discounts is used to inform the producers of goods and services about the current and future requirements of the consumer.

This system pays a premium price to those producers who provide their customer with an acceptable product. Conversely, the producer of an undesirable product is penalised by receiving a discounted price for his goods.

Without such an incentive scheme, production would be orientated to largest quantity at least cost, regardless of quality. There would be no incentive for a producer to put in the extra effort to produce exactly what the customer wants.

Such a system must be supported by a system with the ability to objectively measure “indicators of carcase value” accurately. The system in question usually involves fat depth measurement and it is this objective measurement which allows producers to make price comparisons between works and to allow processors to detail their specifications to producers.

**For example:**

### TRADE & STEER CATTLE SCHEDULE PRICES

Base price cattle 160 Kg to 180 Kg = \$2.45 per kilogram

FAT SCORE								
	1	2	3-	3+	4-	4+	5	6
Weight ranges	0 – 2 mm	3 – 6 mm	7 – 9 mm	10 – 12 mm	13 – 17 mm	18 – 22 mm	23 – 32 mm	33 + mm
160 – 180 kg	-10c	-5c	+2c	+3c	-2c	-10c	-15c	-30c
181 – 200 kg	-10c	-5c	+2c	+3c	-2c	-10c	-15c	-30c
201 – 22- kg	-10c	-5c	+2c	+3c	-2c	-10c	-15c	-30c
221 – 240 kg	-20c	-15c	-8c	-7c	-12c	-20c	-25c	-40c
241 – 260 kg	-20c	-15c	-8c	-7c	-12c	-20c	-25c	-40c
261 – 280 kg	-20c	-15c	-8c	-7c	-12c	-20c	-25c	-40c