

# THE ULTRASOUND REVIEW

## Determination of Backfat Thickness and Loin Eye Muscle Depth in Live Swine with the 50S Tringa Vet

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### ***BACKGROUND***

Recently, Pie Medical and Pharvision (a subsidiary of Classic Ultrasound) introduced the 50S Tringa Vet (Tringa) scanner. This is a lightweight (less than two pounds), wrist-mounted unit that was developed primarily for pregnancy detection in the swine industry (Figure 1) and a variety of applications in the veterinary field. As operators become acquainted with the unit and its capabilities, several have expressed an interest in utilizing the unit for determining rib fat thickness and loin eye muscle depth in gilts/sows as well as market hogs in addition to pregnancy evaluation. One of the primary reasons for this interest is biosecurity of the individual swine operation. While contract scanning technicians are common in the beef industry, swine producers are reluctant to have a contract operator enter their establishment because of the potential of disease transmission. Therefore a need exists for a scanner that can be dedicated for use within an individual swine facility and not used at any other site. The Tringa can meet this need. This publication is intended to provide guidance for utilizing the Tringa for determining fat thickness and loin eye muscle depth in swine. A more detailed description of the technology of real-time ultrasound for scanning swine may be found in another publication (International Swine Study Guide) by the author at:

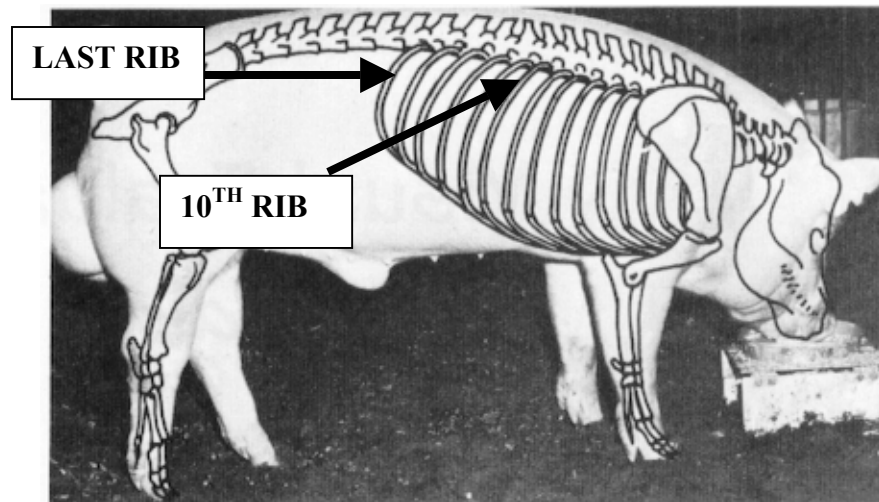
[http://www.utm.edu/departments/agr/agnatres/faculty/Microsoft%20Word%20-%20SWINE%20STUDY%20GUIDE%20English .pdf](http://www.utm.edu/departments/agr/agnatres/faculty/Microsoft%20Word%20-%20SWINE%20STUDY%20GUIDE%20English.pdf)



Figure 1. 50S Tringa Vet in use scanning for pregnancy in sows.

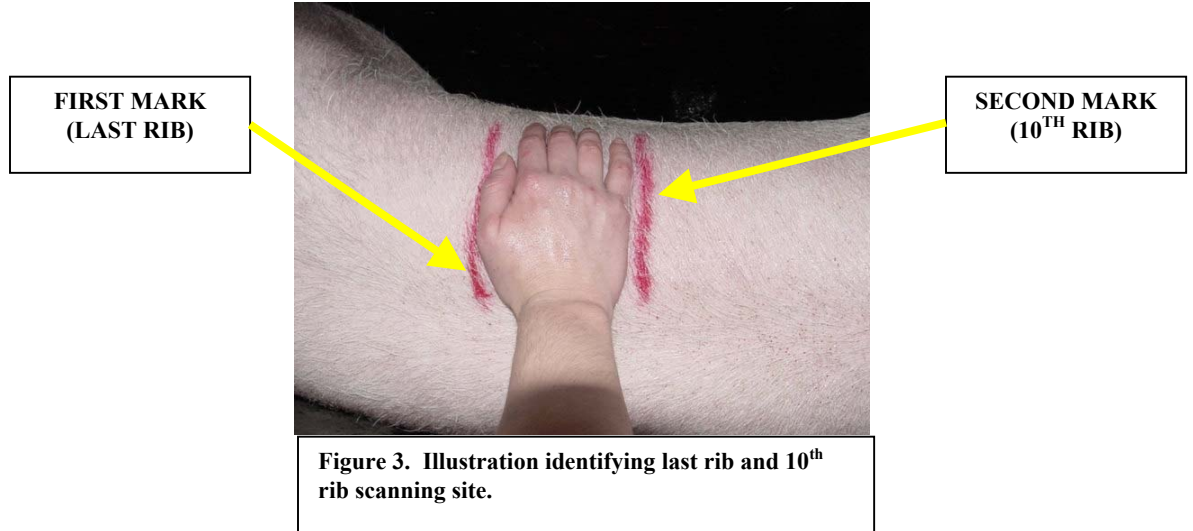
## **TECHNIQUE FOR SCANNING**

The basic background on scanning technique can be located at the above referenced web site. The most common scanning site for determining rib fat thickness and loin eye muscle depth is at the 10<sup>th</sup> rib. It is imperative that operators be able to identify the proper scanning site, and be able to use the same site on all animals they evaluate. Operators should first become familiar with the approximate location of the last rib and 10<sup>th</sup> rib as illustrated in Figure 2.

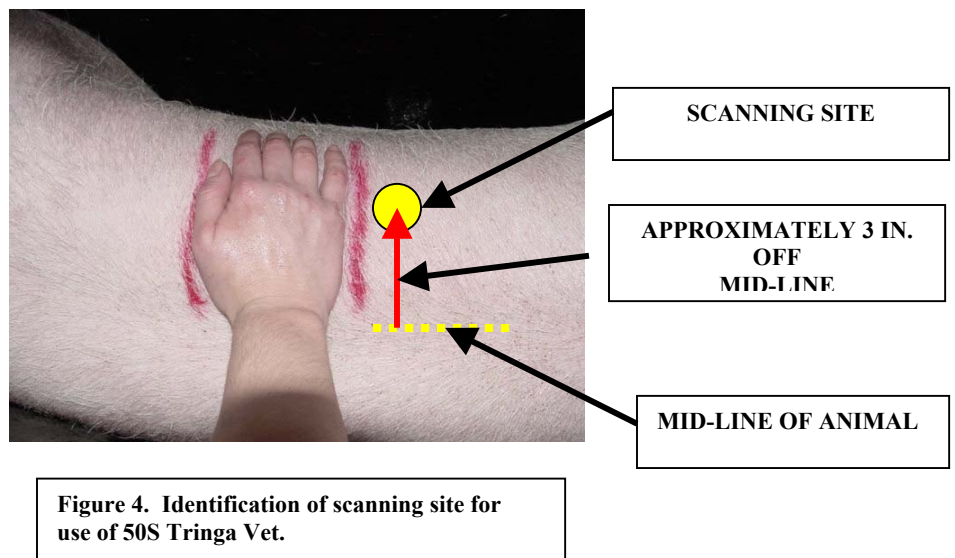


**Figure 2. Illustration of swine skeleton (Adapted from American Yorkshire Club publication).**

While the last rib can be easily palpated, it is more difficult to locate the site of the 10<sup>th</sup> rib. It is suggested that operators consider using the “hand” technique for approximating the location of the 10<sup>th</sup> rib on live swine. Figure 3 illustrates the operator first identifying the last rib and marking. Then if the operator will place his/her hand anterior (cranial) to that mark, a second mark can be made anterior to his/her hand. These marks will then approximate location of the last and 10<sup>th</sup> ribs.



After locating the 10<sup>TH</sup> rib, the scanning site for the Tringa may be identified as illustrated in Fig. 4. Once the 10<sup>th</sup> rib has been identified, the actual scanning site for placement of the probe is approximately 3 inches off the mid-line of the animal and just anterior to the line marking the 10<sup>th</sup> rib.



After locating the appropriate scanning site, a liberal amount of warm vegetable oil should be applied to insure acoustical contact. The Tringa probe (using standoff pad) can then be placed at the identified site (Figure 5). The probe should be placed approximately 3 in. lateral to the mid-line of the animal and perpendicular to the surface of the animal at the mid-point of the width of the loin eye muscle. Once an acceptable quality image is visible on the screen, the operator can depress the **FREEZE** button and the image will be stored on the screen for measurement.



Figure 5. Operator with probe placed on scanning site at the 10th rib.

### ***INTERPRETATION OF IMAGES***

Figures 6 and 7 present two side-by-side images from the same animal. Figure 6 is a typical image obtained with the 50S Tringa Vet (3.5 MHz) at a depth of 4 inches (13 fps) and with a Gain setting of 5. There are four distinct white lines evident beginning at the top of the image and continuing downward (labeled 1-4).

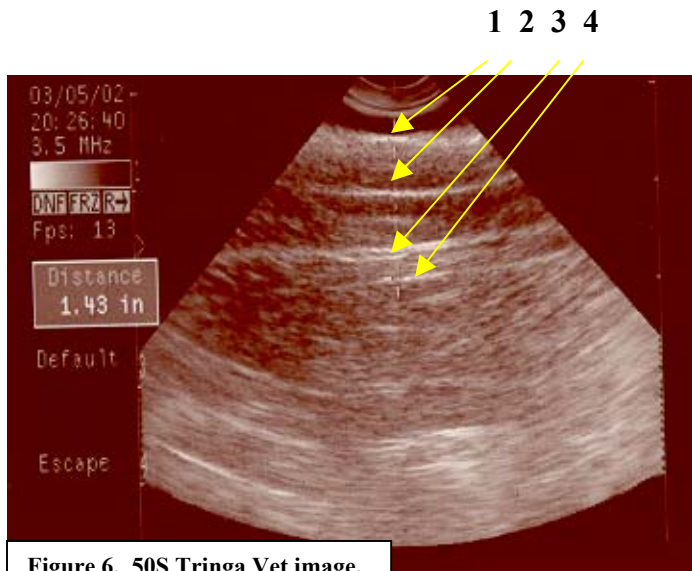


Figure 6. 50S Tringa Vet image.

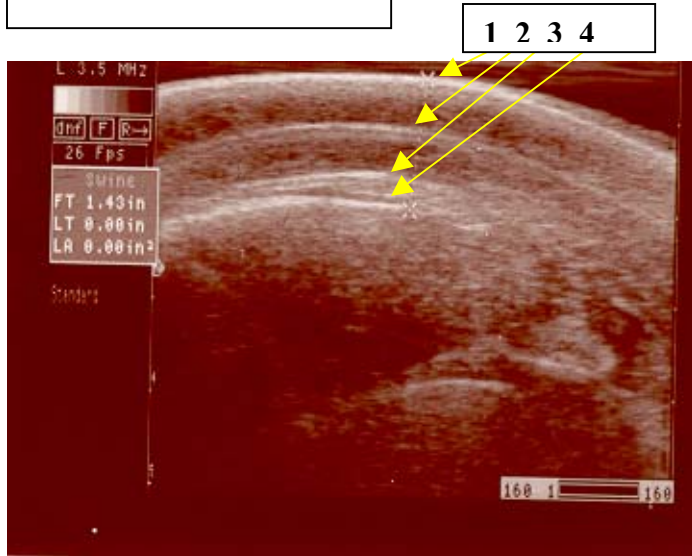


Figure 7. Falco 100 image.

These four lines represent: (1) outer surface of animal (skin), (2) bottom of first layer of subcutaneous fat, (3) bottom of second layer of subcutaneous fat and (4) bottom of third layer of subcutaneous fat. Total fat depth is measured from the outer skin of the animal continuing down to the bottom of the third layer of fat. The skin or hide thickness is included in the subcutaneous (rib fat) measurement on swine. Figure 7 is a corresponding image from a cross-section scan obtained with a Falco 100 equipped with the ASP-18 probe. Again, the corresponding four distinct white lines are also labeled 1-4 and are the same anatomical features as identified in Figure 6. To measure the distance with the Tringa (Figure 8), select the **DISTANCE** function (measures distance between two points) from the menu by depressing the **SET** key until the **DISTANCE** measurement is displayed. Then using the **UP** arrow key, move the caliper cross to the

middle of the top white echo (line1) and depress the **SET** key. This will determine the beginning site for the rib fat thickness measurement. Using the **DOWN** arrow key, move the caliper cross to the middle of the fourth white echo (line 4). The value recorded in the box on the left of the screen under **Distance** is the total fat depth of the animal at the 10<sup>th</sup> rib (1.43 in.). [See operator manual for selecting centimeters (**cm**) or inches (**inch**).] This corresponds to the example measurement obtained from the same animal using the Falco 100 and the cross-sectional scan (Figure 7).

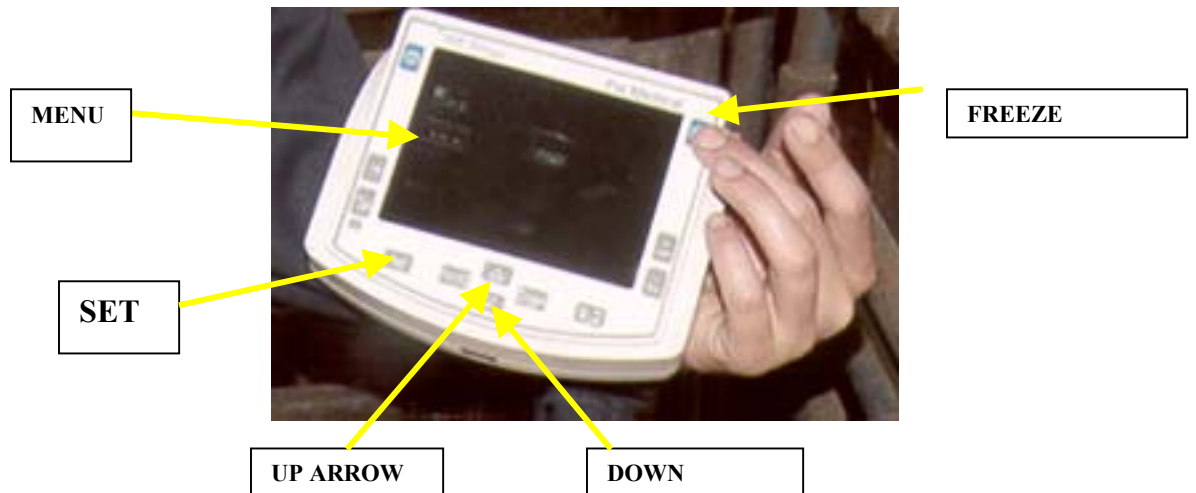
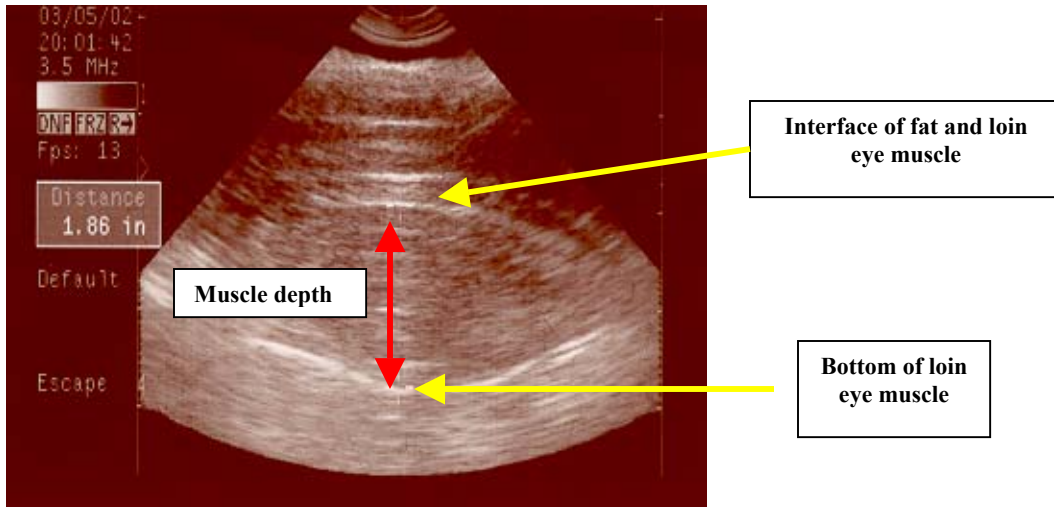


Figure 8. Illustration of control buttons on 50S Tringa Vet.

The loin eye muscle depth can also be measured from the same image as was used for rib fat thickness. Once the rib fat thickness has been recorded, the operator can again depress the **SET** key and this will fix the caliper cross at the echo between the bottom of the rib fat thickness and the top of the loin eye muscle (Figures 6 and 7). The **DOWN** arrow key can be used to move the caliper cross to the bright echo near the bottom of the screen that identifies the bottom of the loin eye muscle (Figure 9).



**Figure 9. Illustration of measurement of loin eye muscle depth.**

Again, the loin eye muscle depth is displayed in the box under **Distance** in the same manner as for the rib fat thickness measurement. By depressing the **FREEZE** key, the screen will be cleared and the operator is ready for a new animal.

### ***SUMMARY***

The 50S Tringa Vet can be effectively and accurately used to estimate both rib fat thickness and loin eye muscle depth at the same level of precision for operators using more expensive real-time ultrasound scanners. Trained operators should be able to measure both rib fat thickness and loin eye muscle depth within 0.05 inch of the actual measurement obtained on a pork carcass. In addition estimates of loin eye area and per cent fat free lean can be determined by incorporating the live weight of the scanned animal, the rib fat thickness at the 10<sup>th</sup> rib and the loin eye muscle depth into available prediction equations (Pork Composition and Quality Assessment Procedures, National Pork Producers Council, Des Moines, IA, pp. 19-20, 2000)

