Pork Information Gateway

National Swine Improvement Federation Guidelines for Ultrasonic Certification Programs

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Introduction

Ultrasonic measurement is a viable method to estimate backfat thickness and loin muscle area in the live pig. However accuracy of ultrasonic estimates are technician dependent. The National Swine Improvement Federation (NSIF) has implemented programs to standardize ultrasonic measurement for these traits. These programs consist of a workshop and training session a scanning practicum for participants and a written exam. Participants will be evaluated for their ability to predict carcass data, repeatability of their measurements and bias of live measurements as compared to carcass data. Persons that receive NSIF certification status must meet or surpass NSIF standards.

Guidelines for Certification are developed by the NSIF Certification Committee. This committee is responsible for developing and refining the certification process. This includes setting certification standards, developing the protocol and specifying the length and limitations of Certification Status. This is an ongoing process that will respond to problems and circumstances that arise as certification of ultrasonic measurement becomes more common place.

The purpose of certification programs is:

> To establish a program for the accuracy assessment of technicians for live ultrasonic measurement of breeding swine of backfat and loin muscle area and grant NSIF certification to those who meet minimum standards. To provide an educational forum for the discussion and standardization of live animal measurement so to improve accuracy of measurement and genetic improvement for lean.

NSIF Certification Program Structure

Programs to teach ultrasonic measurement technique are held on a national and regional basis. Each program or conference can be tailored to meet the specifications or limitations of the host site: however, each conference must follow NSIF guidelines for certification and have as its purpose the purpose developed by the NSIF Certification Committee.

National Conference. The National Certification Conference will be held regularly. A National Conference will be held and conducted by the NSIF committee when a specified number of regional conferences have been held. This conference will be 2-3 days in length and more in depth than the regional conferences. It

will serve as standard for certification conferences and provide information concerning the most recent advances in live animal evaluation.

Regional Conferences. Regional Conferences will be held so to provide greater access of educational opportunities and to certification for ultrasonic measurement. To conduct a regional conference an official host committee must be formed. It is recommended that a member or members of the committee be active in NSIF. The committee must officially submit a request to the NSIF Certification Committee. This request should contain the following:

Statistic	Calculation Formula
Standard Deviation of Prediction	$((\Sigma_i\Sigma_k(Scan_{ijk}-Carcass_i-Bias_j)^2/(N_i-1))^{1/2}$
Standard Deviation of the Difference	$(\Sigma_i(Scan_{ij}2-Scan_{ij}1)^2/(N\bullet_i))^{1/2}$
Bias	$\Sigma_i\Sigma_k((Scan_{ijk}-Carcass_i)/N\bullet j\bullet$

where; Σ is a summation symbol,
$Scan_{ijk}$ is the kth scan taken by the jth technician on the ith pig,
$Carcass_i$ is the carcass estimate for the ith pig,
$Bias_j$ is the bias for the jth technician,
N_i is the counter for number of pigs scanned,
$N\bullet_i$ is the number of unique pigs scanned and
$N\bullet_j\bullet$ is the number of pigs scanned by the jth technician.

Table 1. Certification Statistics.

1. Listing of Committee and association of the host with the National Swine Improvement Federation
2. Location and Sites of Certification Program Activities, including the slaughter facilities
3. Syllabus for the Workshop
4. Name of Tentative Carcass Officials (2)
5. Name of tentative Certified Scanners (2)
6. Tentative Budget

The budget developed by the regional host committee should be realistic. The host committee will be responsible for all costs associated with the regional certification program and will need to solicit donations and set registration fees accordingly. Regional conference must be self supporting.

It is recommended by the NSIF Certification Committee that the number of participants at the regional conferences be limited to 20. Also it is recommended that the Regional Committee divide the responsibilities amongst themselves and solicit the assistance of others so to better take care of the many details in conducting a regional certification conference.

The regional conferences can be shorter in duration (1.5-2 days) than the National Conference and should focus on two (2) priorities. These are: 1). Provide demonstration and training and 2). Provide an opportunity to achieve certification status. It is apparent that untrained ultrasonic technicians do not fully understand the anatomy of the pig, proper location for ultrasonic measurement, proper scanning techniques and handling of performance data. It is recommended that before a certification practicum is conducted, participants are exposed to an educational event that discusses good techniques and habits.

Specifically the following topics need to be addressed. These are:
1. Anatomy of the pig
2. General fat and muscle deposition patterns
3. NSIF recommendations for backfat and loin muscle area measurement
4. Determination of proper probe placement
5. Discrepancies of live and carcass data
6. Use of NSIF adjustments

The scanning practicum must be conducted so that enough time is allowed for each participant to demonstrate her/his abilities. The practicum should be held in a facility that will comfortably hold the animals, the participants and satisfy the needs of both. It is recommended that a full day be allotted for the scanning practicum and the facility be able to allow adequate pig holding, pig movement, provide an environment so technicians can adequately set up their equipment and have easy access to the pigs. Also the facility needs to have an adequate power supply.

The practicum itself must allow for each technician to obtain estimation on each pig twice and be done in

such a fashion so to disguise the identity of each pig. This can be accomplished by renumbering each pig out of the presence of the participants.

The number of pigs needed for the regional conference scanning practicum is 50 pigs. The regional host is encouraged to find facilities that will slaughter all 50 pigs as well. However, if the regional host does not have access to facilities that will allow them to slaughter 50 pigs and collect carcass data then a reduced number will be allowed. The regional host is encouraged to slaughter as many pigs as possible and collect the needed carcass data; however; they must slaughter and collect carcass data on 20% (10 pigs of 50 scanned) of the pigs scanned.

If a subset of pigs scanned are slaughtered then two NSIF certified scanners must be used to develop the standard data set. Slaughter data will be collected on the subset of pigs scanned. The carcass data will be compared to data estimated on the corresponding pigs scanned by the certified scanners. Certified scanners will obtain their estimates independently. Data from the certified scanners will be averaged and bias for backfat and loin muscle area calculated. The estimated bias will then be used to adjust the averaged data from the certified scanners to a carcass basis. This data set will be the standard data set to which participants will be compared.

Pigs chosen for the regional certification conference should be chosen so that the phenotypic variation for backfat ($.0676in^2$) and loin muscle area ($.7569in^2$(to the 2nd power)) be at least as large as what is suggested to be representative of pigs in the industry. Also an approximate equal number of barrows and gifts should be used. If a subset of scanned pigs is slaughtered then pigs chosen for slaughter should be a representative sample with the targets for variation taken into account.

Two carcass officials will be chosen to collect carcass data. They should be persons that have been trained in the area of meat science and regularly evaluate pork carcasses. Carcass officials must follow specified protocol in obtaining the carcass measurement. Specifically, the following guidelines must be used in the collection of carcass data.

Backfat thickness data should only be obtained from carcasses that are not trimmed or skinned at the tenth rib area. If backfat thickness cannot be measured accurately then that carcass should be eliminated from the data set for backfat thickness. The probes used to measure backfat should be those used in the engineering profession which are calibrated to the nearest 1/100 of an inch.

Loin muscle area measurement must also be carefully estimated so not as to implement large measurement bias. If a subset of pigs are slaughtered such as in a regional certification program, pigs should be slaughtered and carcasses should be chilled a minimum of 12 hours and if possible 24 hours. The tenth-eleventh rib area should be marked on the spinal column and the loin section should be removed from the carcass with the skin intact. The cross-sectional cut should done at the 10-11 thoracic vertebrae junction and just adjacent to the 11th rib. The cross-sectional cut should be done with a band saw to ensure a perpendicular cut across the longissimus muscle. The loin muscle area should then be estimated using a grid. The grid should be placed directly on the loin muscle and loin muscle area estimated directly. The grids used should be those marketed through Iowa State University.

If all 50 pigs are slaughtered and conditions are such that entire loin sections cannot be moved to a location that can cross-section the loins with a handsaw then after proper chilling (minimum of 12 hours) then the following procedures should be used. The spinal column should be cut with a meat saw perpendicular to the long axis of the loin muscle between the 10th and 11th ribs. The vertebra should be sawed adjacent to the 11th rib and just caudal to the 10-11 thoracic vertebrae junction to permit a level cut across the longissimus muscle and to avoid hitting the 10th rib. After sawing through the vertebra, and taking care to cease sawing immediately after passing through the bone, use a sharp knife to extend the cut past the lateral edge of the loin muscle, taking care that the knife cut stays perpendicular to longissimus muscle. The loin muscle area should then be estimated using a grid. The grid should be placed directly on the loin muscle and loin muscle area estimated directly.

The two carcass officials will designate one side of the carcass they both will measure. Each official will independently measure backfat off the midline at the 1/2 position and estimate loin muscle area. When the officials differ by greater than .05in for backfat and $.2in^2$ for loin muscle area they will again measure the carcasses in question. Once measurements from the officials are within the stated tolerance ranges, the av-

erage of the two measurements taken for each trait will comprise the official carcass measurement.

Certification with be granted to technicians that meet specified criteria for prediction of carcass (Certified Technician) data, repeatability of ultrasonic estimation, bias and demonstrate proficient knowledge concerning the use of ultrasonic and performance data.

Standard Deviation of Prediction:	Standard Deviation of the Difference:	Bias:
10th Rib Backfat: .15 inches	10th Rib Backfat: .10 inches	10th Rib Backfat: .15 inches
Loin Muscle Area: 50in^2	Loin Muscle Area: .40in^2	Loin Muscle Area: .50in^2

The statistics used to quantify prediction of carcass measurements and repeatability of ultrasonic measurement are the Standard Deviations of Prediction, Standard Deviations of the Difference and Bias which is the average miss of live and carcass (Certified Technician) measurements. The standards for these statistics will be: The calculation formulas can be found in Table 1. Software to calculate the above statistics can be obtained from the NSIF Certification Committee.

Table 1. Certification Statistics

A written examination will be given to the participants and will cover material discussed during the conference as well as pertinent information that ultrasound technicians which assist in performance testing should be aware of. The host committee can acquire a copy of the exam given at the National Conference. In the determination of certification status, the exam will be used in borderline cases where another criteria is needed to ascertain ability.

The host committee will determine which participants meet certification standards and will release for public knowledge only those persons that certified. The complete participant list will not he made available for public release. Participants who meet minimum standards at a regional conference will have full certification status.

Upon conference completion the host committee will send a copy of the names and addresses of all participants and indicate which participants certified and for which traits (i.e. tenth rib backfat thickness, loin muscle area or both) to the chairman of the NSIF Certification Committee. Also a copy of all participant and carcass data will be sent as well. The NSIF Certification Committee Chairman will then send to those that certify an appropriate letter and certificate.

Certification Status

In general, persons that become certified will retain their certification status until a combination of three (3) regional and/or national certification programs have been conducted. Complete certification status implies that a person can competently scan pigs ultrasonically and interpret the images, if they certify with B-mode equipment. Persons that certify must recertify during the third and no later than the fourth conference. Participants which earn certification status either at a regional or national program will not be differentiated.

Image Interpretation Certification

Persons that interpret B-mode ultrasound images for estimation of tenth rib backfat and loin muscle area and do not scan pigs must also become certified. These persons can participate in either a regional or national conference. These persons will interpret images generated by a scanner who they regularly interpret images for. The scanner must scan the pigs at the conference. The person will then interpret these images while supervised and provide their results to conference officials. If certification status is achieved then certification status will be for image interpretation only.