

Definitions of statistics used by UGC

Abbreviations

IMF = intramuscular fat = also referred to as Pfat = the estimated percentage of fat within the ribeye muscle.

RIBFT = rib fat = the estimated fat depth outside the ribeye muscle

REA = ribeye area = the area of the ribeye muscle between the 12th and 13th ribs

RIB = the location or the scan from which REA and RIBFAT are measured

RMPFT = rump fat depth

IQ = image quality

See the UGC Study guide for detailed descriptions of these measurements.

Image Quality

Each scan collected and submitted by a technician during proficiency testing is graded for image quality (IQ) score. The same scoring system is used by UGC Accredited Labs to grade every ultrasound image submitted by UGC Field Technicians for use in beef cattle genetic evaluation. The 7 IQ categories are weighted according as show in the table below.

Classification	Acceptable		Marginal			Reject	
Image Quality Score	1	2	3	4	5	6	7
Proportion of an acceptable image	1.00	1.00	0.75	0.50	0.25	0.00	0.00

A final IQ score for a trait is the average weighted score across all animals scanned for a given trait. For example, if a tech scanned 4 animals for RIB and the scans were graded as follows:

Scan	IQ Score	Weight
1	2	1.00
2	5	0.25
3	7	0.00
4	3	0.75

The Tech's IQ would be the average of the weights = $(2.00/4) = 0.50$

For proficiency testing, each tech is asked to scan 40 animals.

UGC standards for related to image quality during proficiency testing are presented below:

	RIB	IMF	RUMP
% Acceptable Images	≥ 85%	≥ 85%	≥ 95%
IQ	≥ 0.75	≥ 0.70	≥ 0.90

NOTE: For carcass measurements (REA, RIBFT, IMF, RMPFT), only acceptable images are interpreted and used to compute the following statistics.

Statistics

Correlation = a statistical measure of the degree of association between two variables. As used by UGC, correlations measure the association between predicted carcass measurements (i.e., via a tech's ultrasound scans) and the predicted carcass measurements made from scans collected by reference technicians (or, in some cases, the actual carcass measurements). Correlation coefficients range between -1.0 and 1.0. Correlations close to these extremes indicate a very high degree of association between the variables. Correlations closer to zero indicate a low degree of association. Correlations computed by UGC are normally positive (i.e., between 0.0 and 1.0). Ideally, we want correlations to be very high (i.e., as close to 1.0 as possible).

Bias = an average measure of how "far off" a tech's predicted measurements are from the true measurements (i.e., measurements made by reference techs or the actual carcass data). Ideally, we want bias to be as close to zero as possible.

Absolute Bias = absolute bias is just like bias (see above) except that the sign is ignored (i.e., positive or negative), that's why we call it "absolute" bias. Ideally, we want absolute bias to be small. In some ways, absolute bias provides more information than bias.

Standard Error of Prediction (SEP) = measures the accuracy of a tech's predictions for the carcass measures. SEP is a function of the variation of the trait and the correlation. Ideally, we want this value to be small.

Standard Error of Repeatability (SER) = measures the accuracy of repeated measurements on the same animal. During proficiency testing, techs scan each animal twice. SER is predicted from the differences between a tech's two scans on each animal. Ideally, we want this value to be low.

UGC Standards for these statistics for proficiency testing are presented below:

	RIBFAT	REA	IMF	RMPFT
Correlation	≥ 0.850	≥ 0.700	≥ 0.500	≥ 0.900
Absolute Bias	≤ 0.050	≤ 1.000	≤ 0.700	≤ 0.020
SEP	≤ 0.050	≤ 1.100	≤ 1.000	≤ 0.050
SER	≤ 0.050	≤ 1.100	≤ 0.750	≤ 0.060