Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 10 *Swine Day (1968-2014)*

Article 315

1986

Live animal ultrasonic evaluation of backfat thickness and loin-eye

L M. Turlington

L R. Corah

Dell M. Allen

See next page for additional authors

Live animal ultrasonic evaluation of backfat thickness and loin-eye

Abstract

Determination of backfat thickness and loin-eye area in swine is essential for continued genetic progress, and ultimately, pork product acceptance. Leaner, faster growing boars and gilts must be provided by seedstock suppliers to the commercial swine producer. Research information has consistently shown that lean, fast growing boars are more feed efficient. Since feed represents 60% to 75% of the total cost of production, any genetic improvement in feed efficiency would have a rapid payback to the commercial producer. Obviously, swine producers that utilize "lean value" marketing programs must have backfat and loin-eye area data on replacement boars, in order to take advantage of marketing opportunities.; Swine Day, Manhattan, KS, November 20, 1986

Keywords

Swine day, 1986; Kansas Agricultural Experiment Station contribution; no. 87-133-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 507; Swine; Ultrasonic evaluation; Backfat thickness; Loin-eye

Authors

L M. Turlington, L R. Corah, Dell M. Allen, and Jim L. Nelssen

LIVE ANIMAL ULTRASONIC EVALUATION OF BACKFAT THICKNESS AND LOIN-EYE

L.M. Turlington, J.L. Nelssen,

L.R. Corah, and D.M. Allen

Determination of backfat thickness and loin-eye area in swine is essential for continued genetic progress, and ultimately, pork product acceptance. Leaner, faster growing boars and gilts must be provided by seedstock suppliers to the commercial swine producer. Research information has consistently shown that lean, fast growing boars are more feed efficient. Since feed represents 60% to 75% of the total cost of production, any genetic improvement in feed efficiency would have a rapid payback to the commercial producer. Obviously, swine producers that utilize "lean value" marketing programs must have backfat and loin-eye area data on replacement boars, in order to take advantage of marketing opportunities.

Many packing plants have shifted buying programs from a live weight basis, to a "lean value" program with emphasis on carcass backfat thickness and muscling. Changes in packing plant buying programs have been caused partially by consumer demands for "leaner" pork products. Thus, the need for improved methods of accurately measuring backfat thickness and loin-eye area in the live animal are essential to the swine industry.

A recent advancement in the field of ultrasonic technology has been the development of "real time" scanning. Originially intended for use in the medical field as a diagnostic tool, real time ultrasonics has been revised for animal application. One such instrument is the Technicare 210DX[1], which is currently being used in the Kansas State University Extension Animal Science Program.

Ultrasonic technique is based on the principle that high frequency sound waves (pulses) transmit through soft tissue. Once the hand-held transducer is placed in contact with the animals' skin, the transducer converts electrical pulses into ultrasonic waves, which are then transmitted into the soft tissues of the animal being examined. When sound waves impinge on the interface between different types of tissue, part of the ultrasonic waves is reflected back to the transducer, which then acts as a receiver. The reflected sound is again converted to an electrical pulse, which is amplified and shown in a visible form on the screen of the machine. Once the image is obtained, a tracing is recorded and the area is determined by use of a planimeter[2]. In swine, ultrasonic measurements for backfat thickness and loin-eye area are taken between the tenth and eleventh ribs.

---

[1]Johnson & Johnson Company, Englewood, CO.

[2]Planix Tamaya Digital Planimeter.

Producers of purebred swine are using the information obtained from Technicare ultrasonic scanning for selection and promotion of breeding stock through the On-Farm Performance Testing Program. Live measurements are adjusted back to weight at 220 lbs. From this information, breed, litter, and sire summaries are produced with potential application for input into an Estimated Breeding Value program. One of the points of emphasis with the use of ultrasound is that it provides information on the live animal without slaughter or harm, thus, enabling its use as a selection tool. Additionally, the Technicare system has been used to provide a method of determining carcass traits in live animals involved in research projects at the University.

Livestock shows at the state and county fair level continue to provide educational opportunities for youth. Those involved in 4-H Market Livestock projects need to be reminded that market pigs are produced for their carcass characteristics. Many times, lack of availability of slaughter plants prevents carcass data collection at livestock shows. Ultrasonic scanning helps alleviate this difficulty and provides an alternative means of collecting carcass information. The information provided on backfat thickness and loin-eye area in conjunction with live weight are used to produce a percent muscle index. An equation for calculating percent muscle, provided by the National Pork Producers Council, is shown below. This computerized indexing allows pigs to be ranked from a live evaluation standpoint on their percent muscle and enables a carcass show to be conducted.

$$\text{Percent of Acceptable Quality Lean Pork} = [81.4 + .06 \times (73\% \times \text{live wt (lb)}) + 2.0 \times \text{LEA (in}^2\text{)} - 14.9 \times \text{10th rib fat depth (in)}] \div 160$$

In an attempt to improve accuracy of ultrasonic measurements taken with the Technicare 210DX, there is continuous verification of data being obtained. Presented in Table 1 are simple correlations of live animal ultrasonic backfat thickness and loin-eye area estimates as compared to those of the carcass:

Table 1. Simple Correlations of Live Animal Ultrasonic Measurements and Carcass Measurements.

No. pigs	Correlation (r)	
	Backfat Thickness	Loin-eye Area
67	.74	.58[a]
28	.76	.84

[a]Although corresponding to a low correlation, the mean loin-eye areas and standard deviations obtained from ultrasound and carcass measurements were very similar. This indicates limited variability in loin-eye area of the selected group of pigs scanned.

Accuracy of measurements taken with the ultrasonic system is dependent on several factors. First, is the technician's capability and experience. The proper use of the equipment is dependent on technique. There is also the obvious problem of consistent anatomical locations from which to take live animal measurements — location of 10th rib on the pig. The movement and orientation of an animal affects the ease and quality of obtaining an image. Animal movement raises the question of the need to snare or confine each pig to a small area while scanning. Other researchers have reported that the tone of muscle may disrupt the velocity at which ultrasound waves penetrate the tissue layers. And finally, the visual interpretation of an image certainly has an influence on the final estimate of the carcass traits being measured.

Current research at Kansas State with the Technicare unit is concentrating on the proper anatomical location of live animal measurements, and comparisons of backfat thickness and loin-eye area in carcasses in a hanging position and carcasses chilled in a standing position. There is speculation that the shifting of tissues and weight may alter subsequent measurements. And again, there is continuous verification of ultrasonic measurements.

Use of the Technicare 210DX at Kansas State University indicates that it can accurately measure backfat thickness and loin-eye area in the live animal, given correct technique procedures. In addition, ultrasonic equipment can be effectively used in educational programs for 4-H, swine producers, and in research applications.