

THE USE OF ULTRASONICS IN MEAT ANIMAL SELECTION

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The goal of any meat animal production enterprise should be to produce slaughter animals which are highly efficient converters of energy into acceptable red meat. The goal is production of a carcass which meets consumer demands for acceptable eating quality, along with a high ratio of lean to fat and bone.

In the past, visual appraisal was the only method available for selection of breeding animals which would create offspring possessing the ability to produce a carcass with a high ratio of lean to fat and bone while being an efficient production unit. An ultimate method was to slaughter half-sib offspring which in some cases was not feasible. Now high-

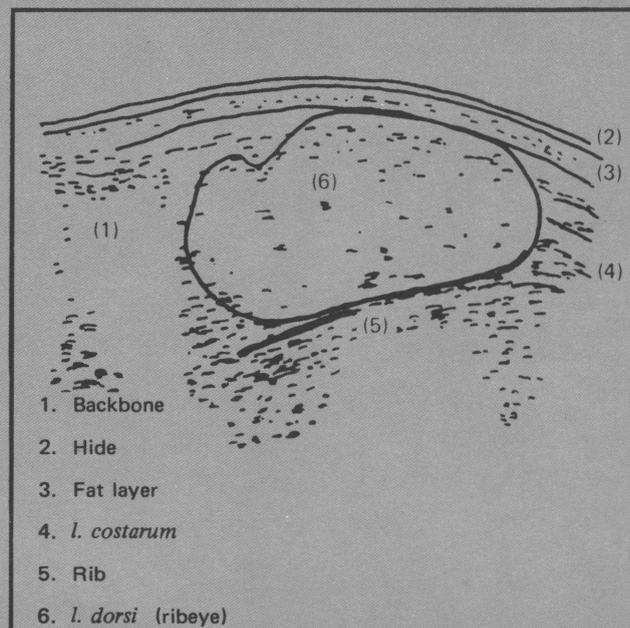
frequency sound (ultrasonic) means are available to determine the muscling and fat of the animal used for breeding.

High-frequency sound operates on the same principle as does radar. High-frequency sound waves are generated and transmitted into the animal's body. When these sound waves come into contact with differently textured tissue such as lean, fat and bone, the movement or speed of the sound waves changes and some are reflected. It is these reflected sound waves which are converted into a light impulse and in turn produce an image on film.

Method of Evaluation

The animals are restrained in a squeeze chute, with a hog holder or by hand. The transducer and guide are affixed over the back between the twelfth and thirteenth ribs in cattle and sheep. In swine readings, the transducer and guide are affixed at the first rib, tenth rib, last rib and the last lumbar vertebra. The animals must be relatively still for an accurate reading.

An example of the scanogram picture is shown in figure 1.



1. Backbone
2. Hide
3. Fat layer
4. *l. costarum*
5. Rib
6. *l. dorsi* (ribeye)

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Figure 1. Diagrammatic sketch of Scanogram picture.

The most accurate information ascertainable from the picture is fat depth over the ribeye of cattle and sheep and average backfat thickness in swine. This gives a measure of the composition of the animal's weight and is highly related to the yield of salable meat from that carcass. This is the most accurate measurement which can be obtained from the ultrasonic picture. The correlation between ultrasonic fat and actual fat measurements on slaughtered animals has been approximately .85-.90, which is quite acceptable.

The other measurement obtainable from the picture is the ribeye area, which is related to total muscling in the carcass or body. The correlation of actual carcass measurement to ultrasonic measurement is about .75-.80.

Both ribeye area and fat thickness are highly heritable traits and can be used in a selection program.

At the time the readings are made, the animals must be weighed, especially in the case of cattle and swine. An accurate birth date is also very helpful.

The information reported to the producer is as follows:

Cattle:

1. Weight
2. Total ribeye area
3. Ribeye area/hundredweight of live weight
4. Total fat thickness

Swine — All measurements are adjusted to a 220-pound basis.

1. Average backfat thickness — actual and adjusted
2. Loin eye area — actual and adjusted

Sheep:

1. Fat thickness
2. Ribeye area

Each animal must be identified by some means, such as a tattoo, ear tag, neck chain or ear notches.

How to Use Data

Ribeye or loin eye area and fatness data can be used in one of two ways. It can be used to merchandize breeding stock or in a breeding and selection program to produce more muscular, correctly finished animals. If used in a selection program, animals should be ranked within their own age and environmental treatment group.

Muscling always should be used in combination with other factors in a selection program such as reproductive performance of the dam, weaning weight, rate of gain or feed efficiency of half-sibs and yearling weight of cattle. Extremely heavy muscling, caused by a "double muscle" syndrome can cause problems in reproductive performance, rate and efficiency of gain and quality grade.

These characteristics all should be used in conjunction with visual appraisal.

Since ultrasonic evaluation of carcass composition requires a considerable amount of interpretation by the machine operator and since not all matings will produce the desired results, breeders are encouraged to collect some slaughter data on a sample of the offspring to determine the validity of the ultrasonic readings, as well as to measure the success of the matings.

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