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ADAPTATION OF ULTRASONICS IN THE SELECTION PROGRAM

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A useful selection tool available to swine producers in recent years has been the ultrasonic animal tester, more commonly called the Sonoray. Increasing numbers of swine producers across the nation have adapted the sonoray to their selection programs in an attempt to more accurately evaluate breeding herd replacements. This report is intended to demonstrate ways that a South Dakota swine producer could use the sonoray in a selection program for total herd improvement.

The use of the sonoray could aid the purebred producer in three ways. Number one, the sonoray could be used to select the best gilts after a preliminary selection has been made. Secondly, the information is an aid to prospective breeding stock customers. Third, the producer could utilize ultrasonic information when selecting herd sire replacements.

The examples presented in this article are taken from actual data that were collected during the period September 1, 1966, to September 7, 1967, in the South Dakota State University swine herds as well as in swine producers' herds throughout the state. Table 1 reports the data from 203 gilts and 65 boars in 10 sonoray groups. Reported are the sonorayed loin eye area average for all animals sonorayed in the group as well as dividing each group into above and below average groups and computing the appropriate loin eye area averages. These divisions were made to point out the differences that may exist within a herd. Selection differentials between the divisions can be calculated using the appropriate group averages.

Selection by ultrasonics should be an additional tool rather than a replacement for other commonly used selection traits such as rate of gain, average backfat, feed efficiency, littermate cut-out and general soundness of the animal. However, after the producer has made a preliminary selection, ultrasonics can give an indication of the meatiness of the animal and help to separate those look alike animals. An example of the possible benefit gained by using the sonoray information can be shown by examining sonoray group 2 of table 1. The preliminary selection program left 43 gilts as possible herd replacements. The 43 head averaged 5.28 sq. in. of estimated loin eye area. The 28 gilts above the average had an estimated loin eye area of 5.73 sq. in. or 0.45 sq. in. more than average. The 15 head below the average had loin eye averages of 4.43 sq. in. or 0.85 sq. in. lower than average and 1.30 sq. in. lower than the top 28 gilts. Thus, with a heritability estimate of 0.5, the top 28 should contribute 0.225 sq. in. increase while the average of the 15 on the lower end would tend to contribute a 0.425 decrease in loin eye area from the current year's average or nearly 0.60 sq. in. decrease from the average of the top 28 gilts.

The second use of the ultrasonic method is that of providing additional information for prospective breeding stock buyers. This information could be collected at the same time as the sonoray work for selection purposes and thus

Table 1. Summary Results of Ten Sonorayed Groups

Group number	Number of animals	Sex	Group average LEA[a,b]	Above average LEA[c]	Below average LEA[d]	High LEA	Low LEA
1	42	G	4.78	5.17	4.40	5.82	3.80
2	43	G	5.28	5.73	4.43	6.42	3.10
3	14	G	4.83	5.13	4.43	5.80	4.11
4	11	G	5.66	6.11	5.29	6.60	5.00
5	10	G	4.77	5.03	4.39	5.40	4.16
5	21	B	5.08	5.43	4.81	5.87	4.16
6	23	G	4.93	5.19	4.65	5.47	4.10
6	27	B	4.74	4.94	4.49	5.36	3.72
7	13	G	5.41	5.80	5.08	6.50	4.50
7	7	B	5.45	5.55	5.32	5.67	5.20
8	10	B	4.44	4.57	4.24	4.76	4.00
9	10	G	4.92	5.23	4.72	5.50	4.51
10	37	G	4.82	5.20	4.38	6.25	3.90

[a] LEA is the abbreviation for Loin Eye Area.
[b] Group average LEA is the average of all animals sonorayed in the group.
[c] Above average LEA is the average LEA of those animals which were higher than the group average.
[d] Below average LEA is the average LEA of those animals which were lower than their group average.

Selection differentials between the groups can be computed by finding the difference between the groups.
The high LEA and low LEA determine the range in the herd and help to demonstrate the within herd variation.

would result in minimum additional expense, labor and time. This extra effort on the part of the producer has been well spent as many of the customers are willing to pay a little more if they can be reasonably sure that they are purchasing a meatier animal.

The third use is that of using the information when adding replacements to the sonorayed herd. There would be little justification for the producer who owned herd number 2 to select out the gilts with the potential to increase the meatiness of his herd and then randomly buy a boar with no information. A more logical choice would be to make the selection from the top end of group 5's boars. For example, if the selected boar had an average loin eye area of 5.87 sq. in. as opposed to the boar group average of 5.08 or a selection differential of 0.79 sq. in., an expected 0.395 sq. in. increase could be passed on to the offspring by this sire. The results of mating the above boar with the top gilts from group 2 are summarized in table 2.

Since boars and gilts each contribute one-half of the inheritance of their pigs, then the total expected progress is Average Selection Differential of 0.61 multiplied by the heritability estimate of 50% or an expected increase of 0.31 sq. in. of loin eye area. This would tend to be a fairly substantial increase and justification for the extra selection effort.

Table 2. Expected Progress

Trait: Loin Eye Area	
Boar group average	5.08 sq. in.
Selected boar average	5.87 sq. in.
Gilt group average	5.28 sq. in.
Selected gilts average	5.73 sq. in.
Boar Selection Differential	0.79 sq. in.
Gilt Selection Differential	0.45 sq. in.
Average Selection Differential	0.61 sq. in.

In conclusion, the following are considered as summary recommendations for use of the sonoray in a selection program.

1. The sonoray is not a replacement for the good production selection traits commonly used but is an additional aid.

2. Select out the top end of the herd at 180 to 220 lb. or at 4 1/2 to 5 1/2 months of age.

3. Sonoray the selected group and make final selections using these results as a guide.

4. Provide information for potential customers.

5. Use ultrasonic information when purchasing replacements if the high frequency sound information is available.

6. Primarily a tool which has the greatest use in the purebred seedstock producer's herd.

Note: Inquiries regarding sonoray work should be directed to L. J. Kortan, Extension Livestock Specialist, South Dakota State University, Brookings, South Dakota.