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Use of Ultrasonics in Swine Improvement

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Today's swine producer must produce pork that is highly acceptable to consumers yet within a cost that permits a profit.

Ultrasonics allows objective measurement of back fat and loin-eye area, two traits that recent research has shown to have a close relationship to total red meat in an animal. Progressive swine breeders consider these two highly inheritable carcass traits in their selection programs to increase the red meat portion of animals.

Ultrasonics will aid future development and improvement of swine herds by helping producers identify exceptional animals to go into the breeding herd. Knowing the performance and traits of individual animals is important since back fat and loin-eye area vary considerably among litter mates. In fact, measurements from the sire himself are as good a basis for evaluation of the sire as are carcass measurements from 20 of his offspring.

Accuracy of results with ultrasonics depends on the technician's knowledge of the animal's anatomy.

Where to Measure

Measure back fat at three locations on the animal's back. Take the measurements perpendicular to the midline of the animal's back. Make the shoulder measurement 1½ inches to the side of the midline at a point straight up from the back side of the foreleg. Take the loin probe at the last rib 1½ inches to the side of the midline. Take the ham probe 1½ inches to the side of the midline and midway between the last rib and the animal's tail head. The average of the three probes is the back fat thickness at the animal's present weight.

Measure the loin-eye area by taking one ultrasonic reading two inches to the side of the midline of the back between the 10th and 11th rib. Direct the sound beam vertically downward through the back fat and the loin's lean tissue.

The lean depth is the difference between fat thickness and total depth. The depth of lean is multiplied by a constant factor (2.65) to obtain square inches of loin eye.

How to Measure

You must restrict the animal's movement to obtain accurate measurements. Use a swine restraining crate or a swine scale to restrain the hog.

Avoid putting excessive pressure on the measuring instrument to prevent distortion of the fat thickness. Excessive pressure can cause the back fat measurement to be .2 or .3 inch less. Excessively fat animals or those with very little fat may be difficult to measure accurately. Animals with very small or very large loin-eye areas also will be difficult to measure accurately.

Loin-eye Area (square inches)

back fat	total depth reading											
	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4
.4	5.04	5.30	5.57	5.83	6.10	6.36	6.63	6.89	7.16	7.42	7.69	7.95
.5	4.77	5.04	5.30	5.57	5.83	6.10	6.36	6.63	6.89	7.16	7.42	7.69
.6	4.51	4.77	5.04	5.30	5.57	5.83	6.10	6.36	6.63	6.89	7.16	7.42
.7	4.24	4.51	4.77	5.04	5.30	5.57	5.83	6.10	6.36	6.63	6.89	7.16
.8	3.98	4.24	4.51	4.77	5.04	5.30	5.57	5.83	6.10	6.36	6.63	6.89
.9	3.71	3.98	4.24	4.51	4.77	5.04	5.30	5.57	5.83	6.10	6.36	6.63
1.0	3.44	3.71	3.98	4.24	4.51	4.77	5.04	5.30	5.57	5.83	6.10	6.36
1.1	3.18	3.44	3.71	3.98	4.24	4.51	4.77	5.04	5.30	5.57	5.83	6.10
1.2	2.92	3.18	3.44	3.71	3.98	4.24	4.51	4.77	5.04	5.30	5.57	5.83

Chart was arrived at by subtracting back fat from total depth reading, then multiplying the difference by 2.65. Adjust the figure on the chart to 230 pounds. (Adjustment: 0.15 square inch per 10 pounds live weight)

2300

Average Backfat Adjusted to 230 Pounds (in inches)

Total of 3 measurements for back fat (inches)	pounds																				
	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
1.2	.48	.47	.46	.46	.45	.44	.43	.42	.42	.41	.40	.39	.38	.38	.37	.36	.35	.34	.34	.33	.32
1.3	.52	.51	.50	.49	.49	.48	.47	.46	.45	.44	.43	.42	.41	.41	.40	.39	.38	.37	.36	.36	.35
1.4	.56	.55	.54	.53	.52	.51	.50	.49	.49	.48	.47	.46	.45	.44	.43	.42	.41	.40	.39	.38	.37
1.5	.60	.59	.58	.57	.56	.55	.54	.53	.52	.51	.50	.49	.48	.47	.46	.45	.44	.43	.42	.41	.40
1.6	.64	.63	.62	.61	.60	.59	.58	.57	.55	.54	.53	.52	.51	.50	.49	.48	.47	.46	.45	.44	.43
1.7	.68	.67	.66	.65	.63	.62	.61	.60	.59	.58	.57	.56	.55	.53	.52	.51	.50	.49	.47	.46	.45
1.8	.72	.71	.70	.68	.67	.66	.65	.64	.62	.61	.60	.59	.58	.56	.55	.54	.53	.52	.50	.49	.48
1.9	.76	.75	.73	.72	.71	.70	.68	.67	.66	.65	.63	.62	.61	.60	.58	.57	.56	.54	.53	.52	.51
2.0	.80	.79	.77	.76	.75	.73	.72	.71	.69	.68	.67	.65	.64	.63	.61	.60	.59	.57	.56	.55	.53
2.1	.84	.83	.81	.78	.78	.77	.76	.74	.73	.71	.70	.69	.67	.66	.64	.63	.62	.60	.59	.57	.56
2.2	.88	.87	.85	.84	.82	.81	.79	.78	.76	.75	.73	.72	.70	.69	.67	.66	.65	.63	.62	.60	.59
2.3	.92	.90	.89	.87	.86	.84	.83	.81	.80	.78	.77	.75	.74	.72	.71	.69	.67	.66	.64	.63	.61
2.4	.96	.94	.93	.91	.90	.88	.86	.85	.83	.82	.80	.78	.77	.75	.74	.72	.70	.69	.67	.66	.64
2.5	1.00	.98	.97	.95	.93	.92	.90	.88	.87	.85	.83	.82	.80	.78	.77	.75	.73	.72	.70	.68	.67
2.6	1.04	1.02	1.01	.99	.97	.95	.94	.92	.90	.88	.87	.85	.83	.81	.80	.78	.76	.75	.73	.71	.69
2.7	1.08	1.06	1.04	1.03	1.01	.99	.97	.95	.94	.92	.90	.89	.86	.85	.83	.81	.79	.77	.76	.74	.72
2.8	1.12	1.10	1.08	1.06	1.05	1.03	1.01	.99	.97	.95	.93	.91	.90	.88	.86	.84	.82	.80	.78	.77	.75
2.9	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.01	.99	.97	.95	.93	.91	.90	.87	.85	.83	.81	.79	.77
3.0	1.20	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	.98	.96	.94	.92	.90	.88	.86	.84	.82	.80
3.1	1.24	1.22	1.20	1.18	1.16	1.14	1.12	1.10	1.07	1.05	1.03	1.01	.99	.97	.95	.93	.91	.89	.87	.85	.83
3.2	1.28	1.26	1.24	1.22	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.05	1.02	1.00	.98	.96	.94	.92	.90	.87	.85
3.3	1.32	1.30	1.28	1.25	1.23	1.21	1.19	1.17	1.14	1.12	1.10	1.08	1.06	1.03	1.01	.99	.97	.95	.92	.90	.88
3.4	1.36	1.34	1.31	1.29	1.27	1.25	1.22	1.20	1.18	1.16	1.13	1.11	1.09	1.07	1.04	1.02	1.00	.97	.95	.93	.91
3.5	1.40	1.38	1.35	1.33	1.31	1.28	1.26	1.24	1.21	1.19	1.17	1.14	1.12	1.10	1.07	1.05	1.03	1.00	.98	.96	.93
3.6	1.44	1.42	1.39	1.37	1.35	1.32	1.30	1.27	1.25	1.22	1.20	1.18	1.15	1.13	1.10	1.08	1.06	1.03	1.01	.98	.96
3.7	1.48	1.46	1.43	1.41	1.38	1.36	1.33	1.31	1.28	1.26	1.23	1.21	1.18	1.16	1.13	1.11	1.09	1.06	1.04	1.01	.99
3.8	1.52	1.49	1.47	1.44	1.42	1.39	1.37	1.34	1.32	1.29	1.27	1.24	1.22	1.19	1.17	1.14	1.11	1.09	1.06	1.04	1.01
3.9	1.56	1.53	1.51	1.48	1.46	1.43	1.40	1.38	1.35	1.33	1.30	1.27	1.25	1.22	1.20	1.17	1.14	1.12	1.09	1.07	1.04
4.0	1.60	1.57	1.55	1.52	1.49	1.47	1.44	1.41	1.39	1.36	1.33	1.31	1.28	1.25	1.23	1.20	1.17	1.15	1.12	1.09	1.07
4.1	1.64	1.61	1.58	1.56	1.53	1.50	1.48	1.45	1.42	1.39	1.37	1.34	1.31	1.28	1.26	1.23	1.20	1.17	1.15	1.12	1.09
4.2	1.68	1.65	1.62	1.60	1.57	1.54	1.51	1.48	1.46	1.43	1.40	1.37	1.34	1.32	1.29	1.26	1.23	1.20	1.18	1.15	1.12
4.3	1.72	1.69	1.66	1.63	1.61	1.58	1.55	1.52	1.49	1.46	1.43	1.40	1.38	1.35	1.32	1.29	1.26	1.23	1.20	1.18	1.15
4.4	1.77	1.73	1.71	1.68	1.65	1.62	1.59	1.56	1.53	1.50	1.47	1.44	1.41	1.38	1.35	1.32	1.29	1.26	1.23	1.20	1.17
4.5	1.80	1.77	1.74	1.71	1.68	1.65	1.62	1.59	1.56	1.53	1.50	1.47	1.44	1.41	1.38	1.35	1.32	1.29	1.26	1.23	1.20

NOTE: Table takes into account that lean and fat pigs deposit fat at different rates. Formula for adjusting in computer programs: Adjusted Back Fat = ([(230 - actual weight) x .004] + 1.0) x unadjusted average back fat.