

ANIMAL SCIENCE

Title: Development of Condition Scoring Guide – using live animals - **NPB #05-172**

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Stated objectives from the original proposal –

1. Develop educational materials to assist pork producers and animal caretakers in the evaluation of sow body condition,
2. Estimate the amount of feed and associated costs that are necessary to add weight to cull sows, and
3. Estimate the cost / benefit of adding weight to cull sows that are from a modern – lean genetic line.

Progress towards meeting the objectives

Objective 1. Develop educational materials to assist pork producers and animal caretakers in the evaluation of sow body condition.

Articles were developed based in part or solely on this work and were recently published in the BluePrint Series of the National Hog Farmer magazine. These articles include:

1. Johnson, C., K. Stalder, and L. Karriker. 2006. Sow condition scoring guidelines. National Hog Farmer. Prism Business Media. Overland Park, KS 66212-2216. No. 42 in a series. 51:7-9.
2. Karriker, L., and K. Stalder. 2006. Neutralizing chronic, acute disease challenges. National Hog Farmer. Prism Business Media. Overland Park, KS 66212-2216. No. 42 in a series. 51:23-26.
3. Fitzgerald, R., K. Stalder, and L. Karriker. 2006 Optimizing cull sow value. National Hog Farmer. Prism Business Media. Overland Park, KS 66212-2216. No. 42 in a series. 51:30-37.

Proceedings papers were developed based in solely or in part on the knowledge gained from this study. Papers were presented at the 2006 Pork Academy.

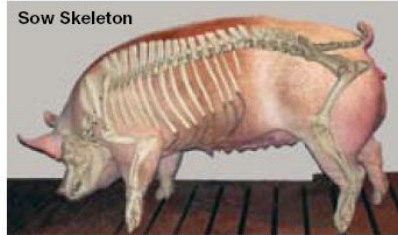
1. Stalder, K., R. Fitzgerald, C. Johnson, and L. Karriker. 2006. Feeding Cull Sows: When is it a money making proposition? 2006 Pork Academy Proc. CD-ROM, National Pork Board, Clive, IA.
2. Karriker, L.A. and K. J. Stalder. 2006. Culling criteria for sows and gilts. 2006 Pork Academy Proc. CD-ROM, National Pork Board, Clive, IA.

Additionally, a body condition poster was developed that was included in the same BluePrint magazine from the National Hog Farmer.

Sow Body Condition Scoring

- Sows should be scored early in gestation. To distinguish between fat and muscle, begin by locating the ribs, the backbone and the hips.
- Sow weight can be estimated using a cloth tape measure.
- Ultrasound can be used to obtain backfat estimates at the sow's last rib.
- Pictures on the reverse show a rear view of a sow as her body condition score (BCS) changes from BCS 1 to BCS 5. A body condition score of "3" is considered "ideal."

These photos present a visual reference to help train your eyes to determine differences in sow condition. Captions for each photo provide descriptions, explanations and backfat estimate ranges for each body condition score. The backfat recommendations for each BCS classification can differ slightly, depending on the genetic lines. Weight and backfat estimates, combined, should be used to estimate daily feeding requirements.



Sow Skeleton

Right: Cloth tape measure
Flank-to-flank measurements using a cloth tape can be used to estimate body weight. The derived equation is: Sow weight (lb.) = (26.85 x flank measure in inches) - 628. Use weight and backfat measurement to estimate feed intake requirements. (See Kansas State University Gestation Feeding Guidelines at: www.asi.ksu.edu)



Above:
Ultrasound
backfat
estimation

Estimating Sow Body Condition Scores



BCS 1

Excessively Thin
Backfat: < 10mm (<0.39 inches)
Ribs, hips & spine are easily visible and palpable. Sow needs large amounts of muscle and fat gain to maintain productivity. **Significantly increase feed allowance to this sow.**



BCS 2

Moderately Thin
Backfat: 10-15mm (0.39-0.59 inches)
Ribs, hips & spine can be palpated with slight pressure. **A moderate increase in feed intake is required before this sow farrows her next litter.**



BCS 3

Ideal Condition
Backfat: 15-22mm (0.59-0.86 inches)
Ribs, hips & spine can be palpated with firm pressure, but cannot be observed visually. **Monitor feed allowance to maintain this level of condition.**



BCS 4

Moderately Fat
Backfat: 23-29mm (0.90-1.13 inches)
Ribs, hips & spine cannot be palpated. **Reduce feed moderately for a more ideal body condition.** Exceeding a sow's dietary requirements results in inefficient use of feed and increased manure.



BCS 5

Excessively Fat
Backfat: >30mm (>1.17 inches)
Ribs, hips & spine cannot be palpated. **Reduce feed substantially for a more ideal body condition.** Sows at BCS 5 have lower feed intake and poorer lactation performance.

Objective 2. Estimate the amount of feed and associated costs that are necessary to add weight to cull sows, and

Objective 3. Estimate the cost / benefit of adding weight to cull sows that are from a modern – lean genetic line.

Twenty-nine sows from current genetic lines were purchased from a large production system. The distribution of sows by beginning body condition score is listed in Table 1. The health status of each sow was evaluated by an Iowa State University swine veterinarian and medications were administered accordingly throughout the

trial. Of note, the greatest problems the sows exhibited upon arrival to the facility were lameness followed by respiratory disease, digestive disorders, and shoulder sores. Initial body condition scores (BCS) were assigned using last-rib backfat measurements as outlined by Tri-State Nutrition Guide. The measurements were obtained using Real-Time ultrasound equipment and a NSIF certified ultrasound technician. Additionally, backfat, loin muscle area and depth were evaluated at the 10th rib using the same machine. Seventeen of 29 sows had an initial BCS of 1, while 8 and 4 sows had an initial BCS of 2 and 3, respectively. Sows were weighed bi-weekly and feed intake was recorded daily.

Sow performance by beginning body condition score are listed in Table 2. The most rapid and efficient weight gained was attained just after weaning. Sows that began the trial at a BCS 1 had an ADG of 4.3 lbs. per day and FE (Feed:Gain) of 2.3 when taking them to BCS 2. The performance of these same sows dropped to 2.5 ADG and 4.1 FE when adding the second BCS. The same can be said for sows that had a BCS of 2 at the beginning of the trial. The performance of the sows with a beginning BCS of 2 was 3.4 ADG and 3.9 FE. When adding the second BCS to the same sows, their performance dropped to 2.9 ADG and 4.7 FE. It is likely that the sows have some compensatory gain that is efficiently added when adding the first BCS as previously reported (Moser and Zimmerman, 1977; Plain, 1983). If producers decide to feed cull sows, it is imperative that they carefully monitor performance relative to market price. In most cases, producers can only justify adding additional weight to sows that are thin (BCS 1 and 2 or in the 300 to 450 lb. weight category). This is where the fastest and most efficient weight gain occurs and is where the greatest increase in market price occurs (taking sows from the 300 - 450 lb. to the 450 – 500 lb. weight class).

Table 3 illustrates breakeven sow market price under three different operational costs per day and three different feed costs (both expressed on a per sow basis). These values are calculated for sows with different BCS starting points and are based upon the corresponding ADG and FE shown in Table 2. Producers should carefully compare the breakeven prices in Table 3 with the historical prices discussed earlier in the article. These values along with the current cull sow market prices will be useful for producers determining whether or not to feed cull sows.

Pork Producers should also be aware of the cull sow marketing situation from both a current standpoint and a historical perspective. Fewer than 5% of cull sows are marketed as “wet” sows (USDA Market News Service, personal communication). In most commercial pork operations, open sows are typically given ample opportunity to re-breed. For this reason, a large proportion of cull sows are marketed after they have been found open and long after the end of their last lactation. Additionally, “wet” sows are steeply discounted, typically \$5 per hundred weight or more (USDA Market News Service, personal communication). Hence, under most U.S. production systems, economic or production factors make it ill-advised to market the majority of cull sow candidates immediately after weaning under most conditions.

Market prices for cull sows differ by depending on the weight class they fall in when being sold. Cull sow prices follow monthly and yearly trends and cycles similar to market hog prices. Cull sow prices are typically reported for four separate weight classes. Figure 1 shows the average market price from 1996 through 2005 for the four different cull sow weight classes. The lowest prices for cull sows were seen in 1998-1999 and 2001-2002. The price pattern between the four different cull sow weight classes was nearly identical across the 10 year period (Figure 1).

From 1996 to 2005 the price difference between selling light weight sows (300 to 450 lbs.) and the next weight class (450 to 500 lbs.) has averaged \$3.13 per cwt. Typically, when cull sow prices and market hog prices are low, there was little if any price differential (price per cwt.) and, at times, even a disadvantage in feeding cull sows to a heavier weight category. When market hog and cull sow prices are relatively high, there can be substantial premium for feeding sows that are in the 300 to 450 lb. weight range up to the next cull sow weight class (450-500 lbs.). Generally, there is only about \$1.50 per cwt. price advantage for increasing the weight of cull sows two weight classes (Figure 2). The summer months (May through August) typically offer slightly better prices for cull sows across the four different weight classes of cull sows (Figure 3). The largest monthly

differential occurs in November through February and averaged over \$4.75 per cwt. across the 10 year time period evaluated (Figure 4). If producers have a high percentage of lightweight cull sows, considerable economic incentive exists for them to feed them until they get to the next weight class in November, December, January, and February. However, producers should recognize that year to year and month to month cull sow price variation does exist and should make marketing plans accordingly.

Operational costs (excluding feed costs) per day greatly influence the profitability of feeding cull sows. Market prices needed for profitability rapidly increase as fixed costs rise beyond \$0.50 per head per day. The situation is similar with feed costs. If the price of feed increases to more than \$0.07 / lb. (\$140/ton), it will be extremely difficult to make feeding cull sows to heavier weights profitable. The only likely exception to this case involves cull sows that lost excessive body condition due to outstanding performance throughout lactation, have no health problems, and are in the lowest weight class (300 - 450 lb.). Of cautionary note, once the first condition score has been added to cull sows, market prices need to increase a minimum of \$13.26 cwt (using \$0.05 feed cost and \$0.25 operational costs) before profit thresholds can be reached again and that price situation is not likely to occur.

Literature Cited

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Table 1. Distribution of sows by beginning and ending body condition score (BCS)

Original BCS	Number of Animals within each ending BCS					Total
	1	2	3	4	5	
1	1	1	.	3	3	8
2	1	2	1	3	10	17
3	4	4
Total	2	3	1	6	17	29

Table 2. Cumulative performance of cull sows by beginning body condition score (BCS)

Trait	Beginning BCS	Cumulative Additional BCS			
		Adding the first BCS	Adding the second BCS	Adding the third BCS	Adding the fourth BCS
Feed Efficiency, lbs.	1	2.28	4.11	4.15	5.63
	2	3.93	4.70	5.16	
	3	3.53	5.41		
Average Daily Gain, lbs/d	1	4.30	2.52	2.72	2.04
	2	3.38	2.90	2.72	
	3	2.74	2.05		
Feed intake, lbs. / d per Day	1	9.60	10.12	11.12	11.51
	2	11.83	12.58	13.80	
	3	10.73	11.02		
Weight Gain per BCS Increase, lbs.	1	81.00	120.41	187.72	195.00
	2	70.90	115.43	155.12	
	3	65.26	98.30		
Feed per BCS increase, lbs	1	21.73	50.77	72.49	95.50
	2	23.52	43.61	55.50	
	3	36.85	66.88		

Table 3. Breakeven cull sow price per cwt. by beginning body condition score assuming three different operational costs per day and three different feed prices.

Operational Costs, \$/day ¹	Beginning BCS	Feed Price, \$/lb. (\$/ton)								
		<u>\$ 0.05/lb. (\$100/ton)</u>			<u>\$ 0.07/lb. (\$140/ton)</u>			<u>\$ 0.09/lb. (\$180/ton)</u>		
		Addition of the first, second, and third BCS			Addition of the first, second, and third BCS			Addition of the first, second, and third BCS		
		1	2	3	1	2	3	1	2	3
\$ 0.25	1	17.21	30.47	29.94	21.77	38.69	38.24	26.33	46.91	46.54
	2	27.05	32.12	34.99	34.91	41.52	45.31	42.77	50.92	55.63
	3	26.77	39.25	.	33.83	50.07	.	40.89	60.89	.
\$ 0.50	1	23.03	40.39	39.13	27.59	48.61	47.43	32.15	56.83	55.73
	2	34.44	40.74	44.18	42.30	50.14	54.50	50.16	59.54	64.82
	3	35.90	51.44	.	42.96	62.26	.	50.02	73.08	.
\$ 0.75	1	28.84	50.31	48.32	33.40	58.53	56.62	37.96	66.75	64.92
	2	41.84	49.36	53.37	49.70	58.76	63.69	57.56	68.16	74.01
	3	45.02	63.64	.	52.08	74.46	.	59.14	85.28	.

¹Operational costs include all expenses excluding feed costs.

Figure 1. Live cull sow and market hog price trends by year and weight class (USDA Market News Service).

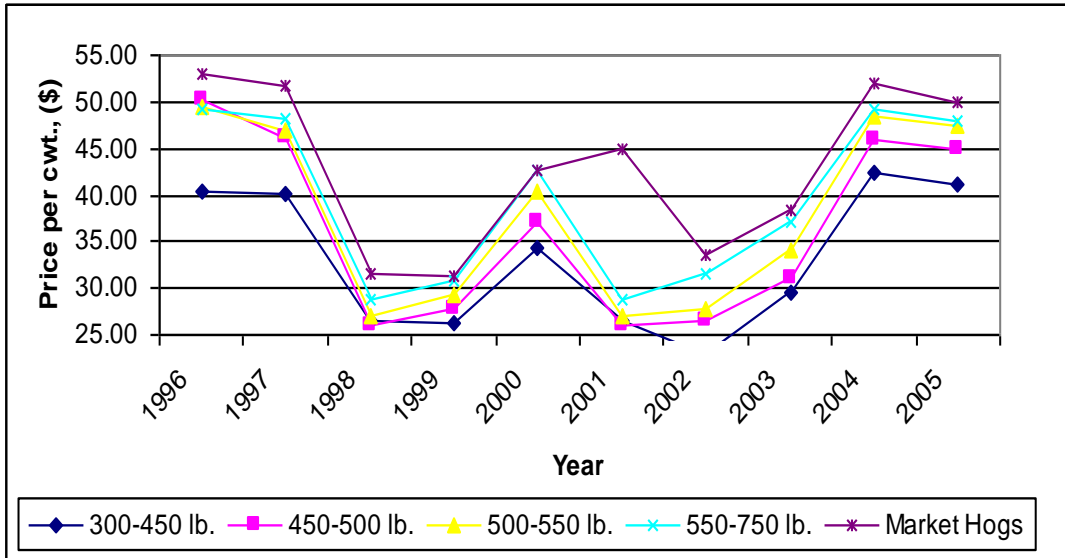


Figure 2. Price differential between weight class of cull sows by sale year from 1996 – 2005 (USDA Market News Service).

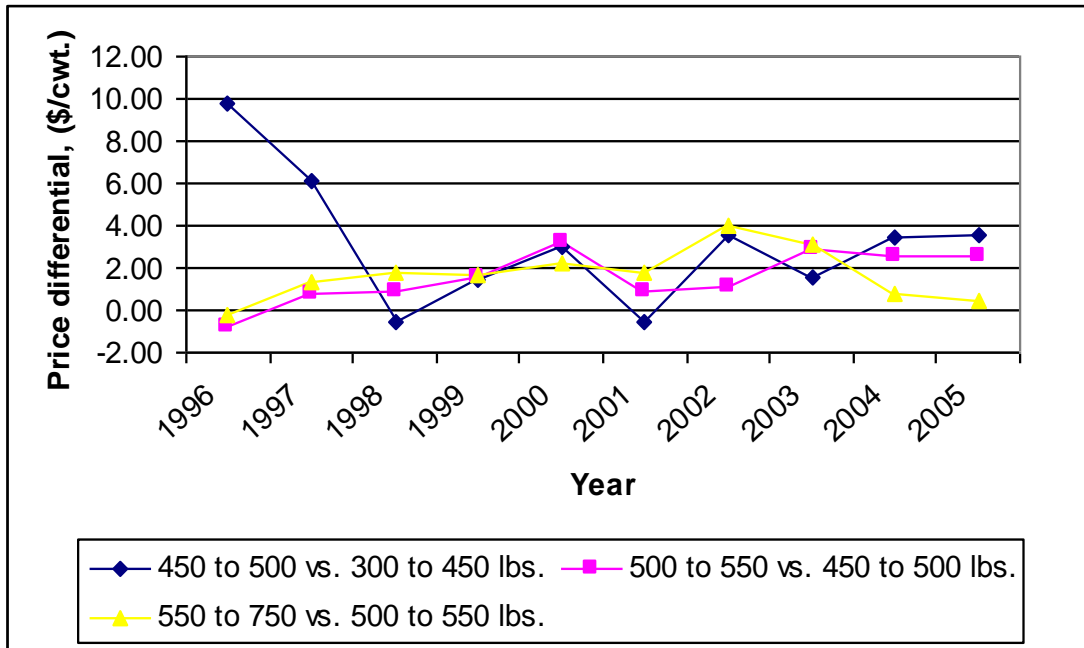


Figure 3. 1996 - 2006 monthly cull sow prices by weight class (USDA Market News Service).

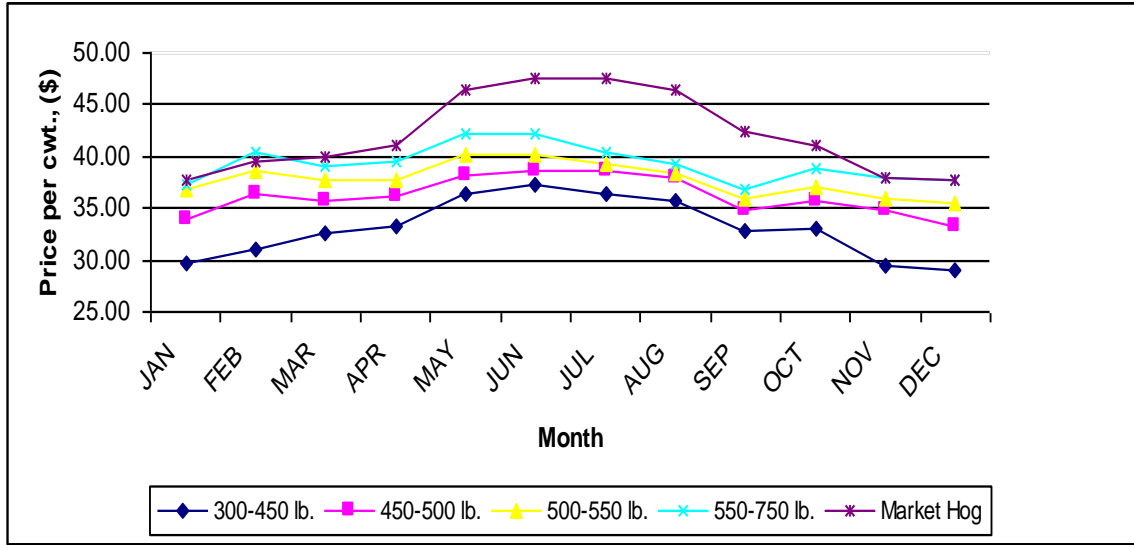
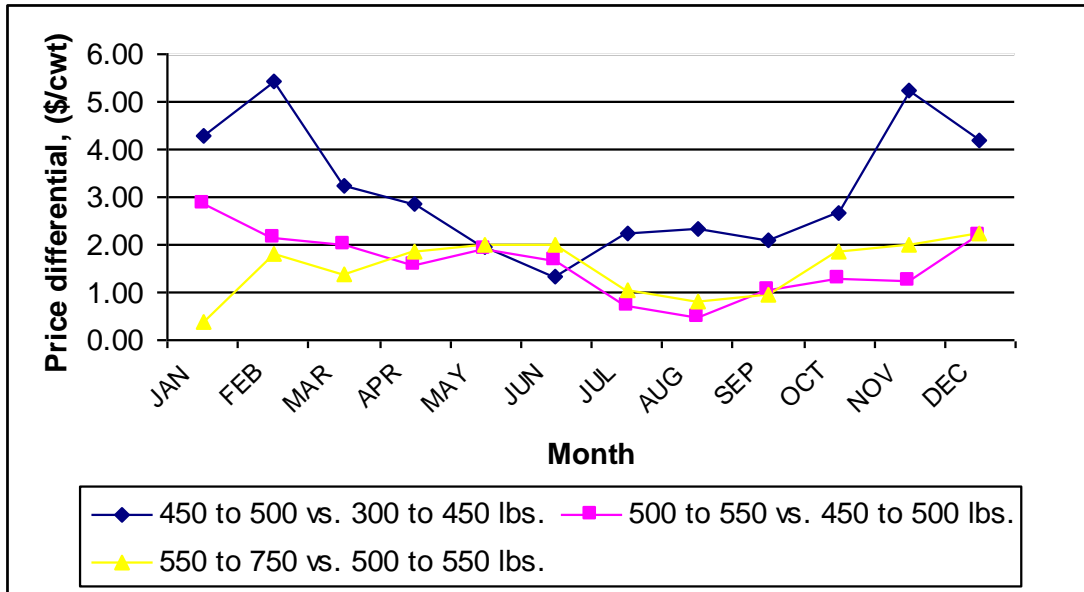


Figure 4. Price differential between weight class of cull sows from by sale month from 1996 – 2005 (USDA Market News Service).



Lay Summary

The objectives of the study were to develop educational materials to assist pork producers and animal caretakers in the evaluation of sow body condition, to estimate the amount of feed and associated costs that are necessary to add weight to cull sows, and finally to estimate the cost / benefit of adding weight to cull sows that are from a modern – lean genetic line. New tools were developed to assist pork producers in the evaluation of body condition of breeding herd females. The tools include a poster that was included as an insert to the May Blueprint issue of the National Hog Farmer magazine. Additionally, two additional pages describing the evaluation of body condition were added to the Gilt Evaluation Pocket Guide.

When determining whether to add weight to cull sows to increase their value, producers should determine if health is the likely reason that an individual sow is thin when making culling decisions. Because of increased mortality risks, sows with obvious health issues are not good candidates to feed to heavier weights. Cull sows that are light weight because of their high productivity can efficiently add weight where a producer can increase profit. Producers will have to identify whether existing, relatively low cost facilities are available for feeding cull sows. If reasonable facilities are available and based on historical cull sow prices, it appears that it is profitable to feed cull sows that fall into the sow processors lightest weight category (less than 400 lbs.). However, high operational costs (due to labor allocation and / or facilities) can make feeding cull sows unprofitable. Producers should be aware of current market price and the historical prices and relationships between different cull sow weight class prices to determine the likelihood of that feeding cull sows to heavier weights will be a profitable decision. Additionally, feed costs are an important consideration when producers are considering adding weight to cull sows. A specialized, low cost cull sow diet may be required to add weight economically efficiently. Profit can be attained only when feeding healthy sows, utilizing the lowest price feed available, and with cheap, underutilized or depreciated facilities.

Planned activities

- Revise and enhance fact sheet (PIH-123 Plain and Shurson, 1999),
 - PIH-123 will be revised with data derived from modern lean genotypes and historic market prices.

Planned publications:

1. Fitzgerald, R., K. J. Stalder, L. A. Karriker, L. Layman Performance and economic returns to feeding thin cull sows to heavier weights.