Kansas State University Lean Value Marketing Program

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Summary: *The Kansas State University (KSU) Lean Value Marketing Program was designed to investigate the value of pigs marketed on a wholesale-cut basis. This program allowed producers to directly compare the actual wholesale value of their pigs with the value of pigs from other producers. Sort loss penalties and yield premiums were calculated in a manner typical of carcass-merit systems. Grade premium was determined on the basis of wholesale cuts. Although sort loss bears no relationship to the quality of the pigs being marketed, it has an enormous impact on producer profitability from carcass-merit buying programs. Differences in grade premiums among herds were substantial; however, yield was not positively correlated with grade and should not be construed as a quality premium. Of the wholesale cuts, loins were most closely correlated with carcass value, representing 21% of the carcass weight, but approximately 40% of the total carcass value. Backfat thickness alone was not as accurate as loin weight in accurately predicting lean, heavily muscled pigs. This study demonstrated that a wholesale-cut system would provide a large economic incentive for producing uniform, lean, heavily muscled pigs.*

Although retail demand for leaner, more heavily muscled pork has changed the orientation and terminology of the swine industry, it is often unclear to producers (who sell to the packer, not the retail consumer) whether there is an adequate economic incentive for them to incur the costs necessary to improve the genetic basis of their herds. Producers often market their pigs to several companies, and because slaughter sheets do not follow a uniform format in reporting carcass data, producers find it very difficult, if not impossible, to:

- compare their pigs with pigs from other producers;
- compare among packers the incentive to produce a lean pig; and
- determine whether there is an adequate financial incentive to invest in leaner genetics for their herd.

GLK: Douglas County Extention Agricultural Agent, Lawrence Kansas; Correspondence to MDT: Northeast Area Extension Office, 1515 College Avenue, Manhattan, Kansas 66502-2796; JLN, RDG, SSD: Department of Animal Sciences and Industry, Kansas State University, Manhattan Kansas.

With a uniform carcass-value program, price comparisons among different producer groups and packing companies could be meaningful.

Schroeder[1] reported that pricing pigs based upon the end-use values of their carcasses can help enhance retail pork quality, which is a primary goal of the pork industry. To help producers compare their pigs with those of other producers and to aid them in determining which packer will provide the maximum incentive for lean pigs, Kansas State University (KSU) has developed a Lean Value Marketing Program. The objective of this program is to help Kansas producers understand the value of the pigs on their farms when marketed on a wholesale-cut basis.

Methods

To obtain market weight gilts for this survey, we targeted four major regions of swine production in the state of Kansas. We sent approximately 35 producers in these four regions a letter inviting them to participate in the KSU Lean Value Marketing Program. To participate in the program, the producers had to:

- be able to consign 25 gilts;
- know the genetic background of the gilts; and
- be able to pay a prorated share of the freight from their farm to the packing plant in Oklahoma.

To limit the variation among pigs from each farm, we used only gilts in the study. (Variation and value differences would have been greater if barrows had been used as well.)

Twenty-five pigs from each of the 34 producers who consented to participate in the study were sold and evaluated on three different marketing dates:

- 9 farms in June 1992;
- 16 farms in July 1992; and
- the remaining 9 farms in September 1992.

Prior to loading the gilts on the trucks, each producer's group was tagged with a different color eartag. The gilts were held on the truck for no more than 12 hours, and spent between 6 and 8 hours in transport to the slaughterhouse. Since Reeves Packing Company in Ada, Oklahoma determines grade premium on the basis of wholesale cuts, it was used in this study to evaluate differences in carcass value.

Upon arriving at Reeves Packing, the gilts were grouped by eartag color, weighed, and penned. All gilts arrived between 2:30 am and 5:30 am on the day of slaughter.

After slaughter, carcasses (heads off) were weighed individually as they left the kill floor. Using a ratio, all carcasses were standardized to a 240 lb (108 kg) pig with a yield of 75%. Once the carcasses were in the cooler, KSU personnel measured backfat at the first rib, tenth rib, last rib, and the last lumbar vertebra. Because backfat was measured at the midline on hot carcasses, it was slightly thicker than if it had been measured on cold carcasses or off the midline.

The carcasses were intermittently spray-chilled overnight and cut into wholesale cuts the following morning. The plant manager weighed and recorded all of the wholesale cuts for the test groups involved in this study, including hams, loins, butts, picnics, spareribs, bellies, trim 72%, trim 42% (i.e., all trim that can be tested by the USDA to be 72% and 42% lean, respectively), jowls, pork fat, neck bones, feet, and scrap/bones. He also weighed fat trim, and calculated cooler shrink/cutting loss by subtracting the total pounds weighed during cutout from the carcass weight. Loins were the only closely trimmed wholesale cut (fat cover of 1/8" or less). The weight of the other main cuts (ham, butts, picnics, spareribs, and bellies) included fat and lean.

Reeves Packing determines base price by weighing the carcass and calculating a base value that is halfway between a #1 and a #2 pig on the USDA price sheet. Because the gilts were marketed during three different months, we used June 1992 prices to standardize all loads for comparison.

Sort loss

The sort loss penalty is the value lost when a carcass falls outside the standard carcass weight range for each specific packing company. Grade, backfat, or lean meat percentage has no bearing on the amount deducted for sort loss; it is based entirely on carcass weight. The sort loss penalty is money that producers could have received no matter what quality of pigs they produced.

Many plants impose a severe penalty for underweight pigs because lightweight carcasses decrease their efficiency; it takes almost the same amount of time to dress a lightweight pig as a heavier pig. Although the acceptable live weight range at Reeves Packing was 215-255 lb (97.5-115.7 kg), producers were asked to supply gilts weighing 230-250 lb (104.3-113.4 kg) to ensure a 168-190 lb (76.2-86.2 kg) carcass.

Yield

Yield or dressing percentage is defined as carcass weight divided by live weight. The yield was compared against the plant standard for Reeves Packing Company (73%). The difference between the standard and actual dressing percent determined the yield premium.

Grade

Grade premium is the producer's reward for supplying the packer with a superior product—a pig that is leaner than the plant standard. At Reeves Packing, grade premium is calculated on the basis of wholesale cuts. Every lb of carcass muscle is worth approximately $1.30 ($0.59 per kg), and every lb of fat is worth $0.12 ($0.05 per kg), although these values can vary as pig prices change. Reeves Packing calculates the grade premium by weighing each individual wholesale cut and then paying a premium for any cut that exceeds their plant's weight standard for that cut. (Any cut that weighs less than plant standard is penalized.) The wholesale premium/penalty is based on the current price for each individual cut from the USDA Wholesale-Cut Price Sheet (Table 1).

Statistical analysis

We used correlation coefficients to evaluate the relationship between individual wholesale cuts, fat trim, or backfat and total carcass value. We used multiple regression to predict carcass value from fat trim, tenth-rib backfat, and loin percent or a combination of fat trim and loin percent.

Table 1

June 1992 averaged USDA wholesale-cut prices.

Cut	USDA wholesale-cut price per cwt.
Hams	$69.50
Loins	$138.00
Butts	$106.00
Picnics	$40.00
Spareribs	$130.00
Bellies	$34.00
Trim 72%	$57.25
Trim 42%	$25.00
Pork fat	$12.75
Neck bones	$11.00
Feet	$10.00
Scrap/bones	$0.00

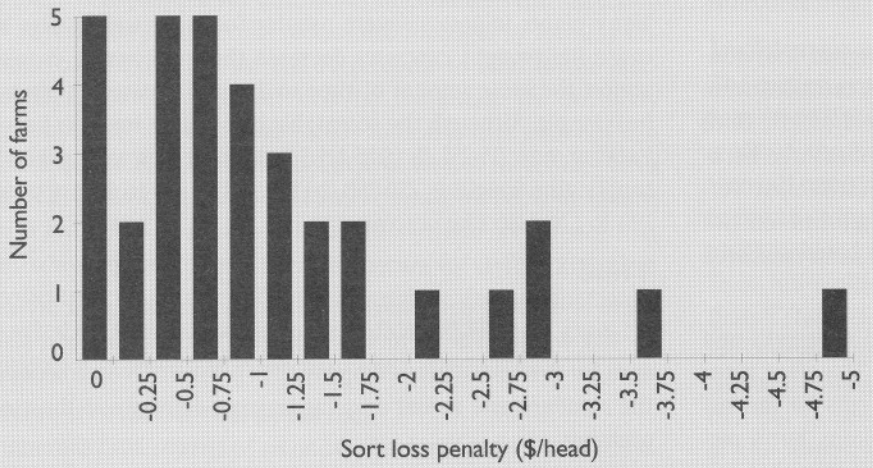
Results and Discussion

Sort loss

Sort loss penalties for the 34 farms in this program ranged from $0.00 to $4.95 per head. Five of the 34 groups had no sort loss penalty, whereas one group had a deduction of $4.95 per head (Figure 1). The median sort loss was $0.78 per head (mean = $1.08).

In a recent study at the University of Nebraska,[2] 110 consecutive shipments had an average sort loss penalty of $3.10 per head. Minimal sort loss depends on packer programs and farm management; however, a sort loss penalty of $0.30 per head is considered excellent for producers who routinely weigh all pigs before market. For most packers, the sort loss penalty is much greater for lightweight pigs than for heavy pigs (Figure 2).

Figure 1

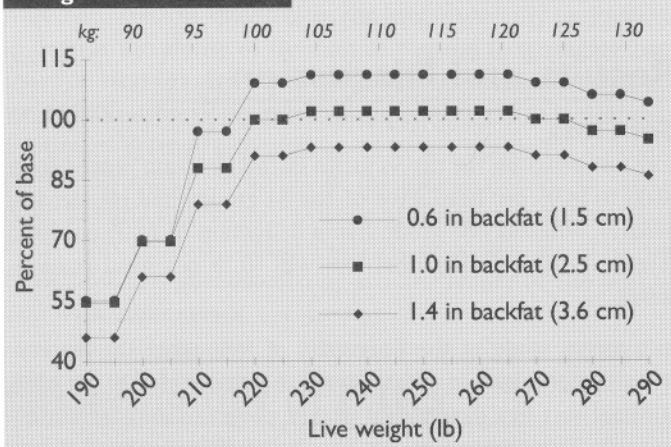


Sort loss penalties among the 34 farms in the study ranged from $0 to $4.95. The median (50th percentile) was a loss of $0.78.

How can producers minimize the sort loss penalty? They must know the ideal carcass weight range for the packing company and the weight of their market pigs. By weighing pigs individually, producers can greatly reduce sort loss. If the average producer in this program, marketing 4000 pigs per year, had an average sort loss penalty of $1.08 per head, s/he would lose $4320 of potential income. The producer with the sort loss deduction of $4.95 per head would potentially lose $19,800. An average of 2 hours of extra labor per week spent weighing pigs to reduce sort loss to zero would result in a return of $190.38 per hour ($4.95 deduction per head) for this producer. At an average deduction per head of $1.08, the return per hour would be $41.54.

Thus, sort loss has an enormous impact on the profitability from carcass-merit buying programs. To minimize sort loss deductions, producers must weigh pigs individually. Concern with sort loss, however, must not be taken to extremes. Astute pork producers will sell pigs at the carcass weight that maximizes their profits. With some packer programs, this weight may be outside of the packers' preferred range, but result in greater net dollars to the producer.

Figure 2



Sort loss penalties are greater for pigs that are too light compared to pigs that are too heavy. These data show percent of base for a representative pig at each of three backfat measures, and is based on the carcass-value grid from Hormel, which was converted to a liveweight basis. The grids for many other packers are similar.

Yield

The yields in this study ranged from 73.86%-76.29%. The average yield was 74.97%. Generally, leaner pigs have slightly lower yields than pigs carrying extra fat. Thus, producers with fatter pigs tend to receive a higher yield premium.

There are only two reasons to determine yield:

- to allow the producer to determine the optimum liveweight to ensure that the carcass will fall into a packing plant's preferred carcass weight range; and
- to allow the packing plant to back-calculate a liveweight market price. If prices were quoted on a carcass-weight basis, it would be unnecessary to back-calculate to a liveweight price.

Producers often misinterpret yield as an indicator of the *quality* of their pigs. Actually, when different producers market to the same plant, the major components of the variability among yields are gut fill and trim loss. When the same producer markets to different plants, the major components of the difference in yields of pigs are skinning, head removal, and distance to the packer.

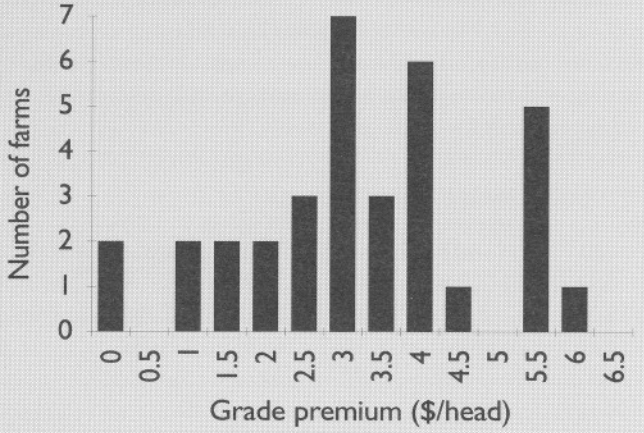
Table 2

Fallacy of yield premiums.

	Carcass weight (lb (kg))	Live weight (lb (kg))	Carcass price ($)	Live price ($)	Yield premium ($)	Live value ($)
Pig 1	171.5 (77.95)	235 (107)	99.47	99.47	0.00	99.47
Pig 2	171.5 (77.95)	230 (104)	99.47	97.29	2.18	99.47

Yield can be influenced only by changing liveweight in relation to carcass weight. Carcass-merit programs that indicate a yield premium on the kill sheet can confuse producers, because they are being paid only for actual carcass weight. For example, consider the "yield premium" for two pigs that have identical 171.5 lb (77.95 kg) carcasses (Table 2). Pig 1 was marketed under normal carcass-merit procedures, while pig 2 was held off feed for 12 hours to decrease gut fill and increase yield. Although yield was 1.6% higher for pig 2 (73% versus 74.6%, respectively),

Figure 3



Grade premiums among the 34 farms ranged from $0.06 to $6.22 per head. The median (50th percentile) was a premium of $3.47 per head. (Mean=$3.49/head.)

because it weighed less its live value was $2.18 less than the actual value of pig 1. The yield premium for pig 2 was $2.18, so ultimately the actual value paid to the producer for this higher-yield pig was no more than for the heavier, lower-yield pig. Thus, the practice of holding pigs off feed to increase yield premium will not influence the total carcass value of the pig. However, it will save the value of feed that would be in the digestive tract at the time of slaughter. (Pigs should not be held off feed for more than 18 hours or the carcass tissue may shrink.)

Grade

Grade values ranged from $0.06 to $6.22 per head (Figure 3). The average grade premium per head was $3.49. The 34 producers in this program market approximately 136,000 pigs per year. The grade premium of $3.49 per head, which is a direct measure of the quality of the pig, results in a combined added income of $474,640 for all 34 producers.

The farm with the highest carcass quality in the study received $6.16 more per head than the farm with the lowest carcass quality. Producers in this program each market an average of approximately 4000 pigs per year. Thus, the farm receiving the best grade premium is realizing $24,640 more income than the farm receiving the lowest grade premium on the basis of carcass quality alone. It is important to remember that this difference would be even greater when the wholesale cuts are further processed into closely trimmed retail cuts.[3]

Backfat

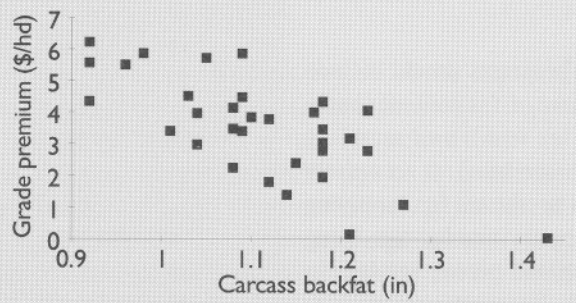
Individual farm results from the study illustrate that carcass value cannot be predicted solely from tenth-rib backfat thickness measurement (Table 3). For example, the farms ranked first, fifth and ninth in actual carcass value had the same tenth-rib backfat of 0.92 in. Simple correlation analysis revealed that backfat and carcass value were negatively correlated ($r = -.72$, $P < .01$) (Figure 4).

Standard deviation (SD) for backfat for each farm indicates the variation in backfat measurements among the gilts from a particular farm. A lower SD indicates a more uniform load of gilts. For each producer, 95% of their gilts will have tenth-rib backfat measurements within two SD of the mean. For example, farm 20 had a mean backfat of 1.08 and a standard deviation of 0.08, indicating that 95% of the gilts from this farm should have tenth-rib backfat measurements between 0.92 and 1.24 in. ($1.08 \pm (2 \times 0.08)$). Conversely, the backfat range for farm 21 would be 0.67 to 1.75 in. ($1.21 \pm (2 \times 0.27)$). Because uniformity is very important in determining market strategies, smaller standard deviations (i.e., a more uniform load) are desirable.

Wholesale cuts

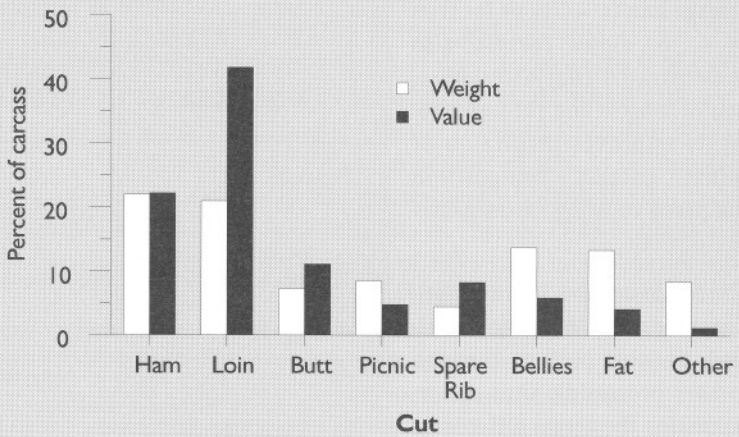
The weight percentages and dollar values of the wholesale cuts varied among the 34 farms (Table 4). Hams and loins represented slightly more than 40% of the carcass weight (Figure 5); however, because they are the high-priced cuts, they represented more than 60% of the value of the carcass. Conversely, bellies (a low-priced cut) represented approximately 14% of carcass weight, but only 7% of the carcass value.

Figure 4



Data from the 34 farms in this study indicate that grade premium is negatively correlated with backfat ($r = -.72$).

Figure 5



Data from the 34 farms indicate that while the loin only represented 21% of carcass weight, it represented 42% of carcass value.

The rankings of the best and worst loads demonstrated that hams and loins were the most important cuts in determining improved carcass value on a wholesale-cut basis. Loins only represented 21% of the carcass weight; however, loins were the wholesale cut most closely correlated ($P < .0001$; r = .84) with carcass value (Figure 6). Other wholesale cuts that positively influenced ($P < .003$) carcass value included hams (r = .46) and Boston butts (r = .61). Decreased carcass value was most closely associated ($P < .001$) with percentage bellies (r = -.62) and fat trim (r = -.87). Because loins were more closely correlated with carcass value than was backfat, carcass-merit programs that are based entirely on backfat measurements do not reward producers as accurately for supplying lean, heavily muscled pigs.

Packer programs should include a measure of fat content (backfat or fat trim) *and* muscling (percentage loin) to accurately reward producers for supplying lean, heavily muscled pigs. Using fat trim and percentage loin in a simple linear regression equation allowed us to predict carcass value very accurately (r^2 = .90). This is much more accurate than using backfat (r^2 = .52), percentage loin (r^2 = .71), or fat trim (r^2 = .76) alone. Forrest[4] also demonstrated that a combination of muscle and fat measurements improves prediction of actual carcass composition compared to using fat measurements alone.

Wholesale cut prices underestimate the true differences realized by the packer through further processing, thus underestimating the actual differences in values among the gilts. Research at Purdue University[3] has demonstrated that using bone-

Table 3

Individual farm results from KSU Lean Value Marketing Program illustrate that carcass value cannot be predicted solely from tenth-rib backfat thickness measurement. Herds were ranked by carcass value only, with no regard given to average daily gain, feed efficiency, sow productivity, or disease status.

Farm	Carcass value ($)	10th rib backfat (in (cm))	SD	Average backfat (in (cm))	Ham value ($)	Loin value ($)	Sire Genotype*
1	128.51	0.92 (2.34)	0.14	1.12 (2.84)	27.98	54.37	PIC
2	128.15	0.98 (2.49)	0.22	1.12 (2.84)	29.20	52.16	PIC
3	128.15	1.09 (2.77)	0.20	1.25 (3.18)	28.30	53.31	TERM
4	128.02	1.05 (2.67)	0.12	1.29 (3.28)	27.97	54.60	TERM
5	127.86	0.92 (2.34)	0.17	1.13 (2.87)	28.72	53.48	PIC
6	127.80	0.96 (2.44)	0.13	1.18 (3.00)	27.93	54.52	TERM
7	126.80	1.03 (2.62)	0.15	1.24 (3.15)	26.81	54.00	TERM
8	126.78	1.09 (2.77)	0.18	1.28 (3.25)	28.07	53.73	TERM
9	126.64	0.92 (2.34)	0.18	1.15 (2.92)	28.44	52.56	PIC
10	126.61	1.18 (3.00)	0.17	1.31 (3.33)	27.12	53.83	DK
11	126.43	1.08 (2.74)	0.15	1.24 (3.15)	27.35	53.78	ROTA
12	126.34	1.23 (3.12)	0.17	1.37 (3.48)	27.05	54.25	TERM
13	126.29	1.17 (2.97)	0.17	1.36 (3.45)	27.63	53.26	PIC
14	126.27	1.04 (2.64)	0.20	1.20 (3.05)	28.90	51.82	TERM
15	126.13	1.10 (2.79)	0.13	1.29 (3.28)	27.70	52.21	LIESKE
16	126.06	1.12 (2.84)	0.13	1.31 (3.33)	27.56	53.23	FH
17	125.77	1.08 (2.74)	0.13	1.22 (3.10)	27.96	52.69	TERM
18	125.76	1.18 (3.00)	0.17	1.33 (3.38)	27.77	51.87	DK
19	125.69	1.01 (2.57)	0.15	1.21 (3.07)	28.34	51.32	ROTA
20	125.69	1.09 (2.77)	0.80	1.32 (3.35)	27.18	52.61	TERM
21	125.48	1.21 (3.07)	0.27	1.38 (3.51)	27.51	51.20	ROTA
22	125.33	1.18 (3.00)	0.11	1.48 (3.76)	27.35	52.01	TERM
23	125.33	1.18 (3.00)	0.18	1.36 (3.45)	28.36	50.95	TERM
24	125.26	1.04 (2.64)	0.17	1.29 (3.28)	27.46	52.56	LIESKE
25	125.07	1.18 (3.00)	0.10	1.32 (3.35)	27.35	52.64	TERM
26	125.07	1.23 (3.12)	0.16	1.44 (3.66)	27.38	51.44	FH
27	124.69	1.15 (2.92)	0.16	1.33 (3.38)	27.16	50.85	FH
28	124.53	1.08 (2.74)	0.11	1.34 (3.40)	27.76	50.75	FH
29	124.26	1.18 (3.00)	0.19	1.42 (3.61)	27.17	51.49	ROTA
30	124.10	1.12 (2.84)	0.17	1.28 (3.25)	28.21	49.78	TERM
31	123.68	1.14 (2.90)	0.20	1.33 (3.38)	27.87	49.90	ROTA
32	122.39	1.27 (3.23)	0.15	1.47 (3.73)	27.03	50.28	FH
33	122.46	1.21 (3.07)	0.14	1.39 (3.53)	27.85	48.74	ROTA
34	122.35	1.43 (3.63)	0.17	1.53 (3.89)	26.55	50.50	ROTA
Avg.	**125.76**	**1.11 (2.83)**	**0.16**	**1.30 (3.31)**	**27.74**	**52.26**	

Notes:

Carcass value is standardized to a 240 lb hog with a 75% yield. Wholesale cut values were determined by multiplying cut weights by the USDA Wholesale-Cut Price Sheet standard value for each cut for June 22, 1992.

The standard deviation (SD) shows, in inches, the amount of variation in the tenth-rib backfat within a producer group.

Average backfat is the average of measurements at first rib, last rib, and last lumbar vertebra. Measurements were taken at the midline on hot carcasses.

Genotype is listed as the sire of the gilts. Groups with sires originating from more than one source are listed as terminal (TERM) or rotational (ROTA) breeding systems. Breeding stock companies listed are Dekalb (DK), Farmers Hybrid (FH), Lieske (LIESKE), and Pig Improvement Company (PIC).

*Genotypes listed in the table are simply for information and do not imply an endorsement or ranking of genetics. The program was designed to compare individual herds, not genotypes.

Table 4

Weight percentages and dollar values of the wholesale cuts among the 34 farms. The rankings of the best and worst loads demonstrated that hams and loins were the most important cuts in determining improved carcass value on a wholesale-cut basis.

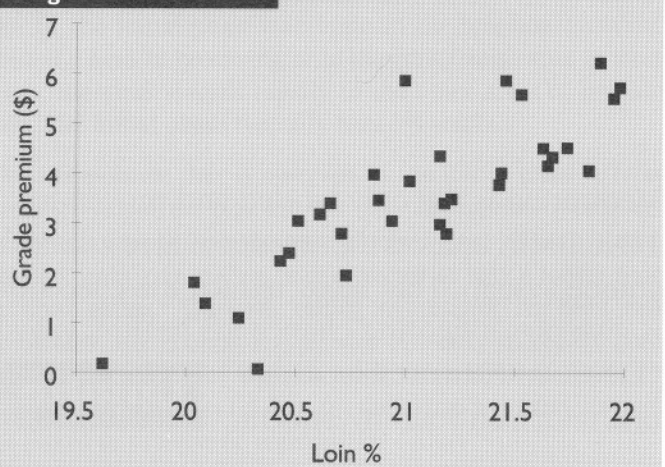
Wholesale Cut	Range						Best Load				Worst Load			
	Highest		Average		Lowest				Rank				Rank	
	% wt	$	% wt	$	% wt	$	% wt	$	% wt	$	% wt	$	% wt	$
Ham	23.34	29.20	22.17	27.74	21.22	26.55	22.37	27.98	10	10	21.22	26.55	34	34
Loin	21.98	54.60	21.04	52.26	19.62	48.74	21.89	54.37	3	3	20.33	50.50	30	30
Butt	7.81	14.90	7.34	14.01	6.79	12.96	7.49	14.29	8	8	7.43	14.18	12	12
Picnic	9.05	6.52	8.55	6.16	7.89	5.68	8.53	6.14	20	20	8.60	6.19	16	16
Primal Cuts	62.18	103.18	59.10	100.16	55.52	95.95	60.28	102.79	8	3	57.58	97.41	29	32
Spareribs	4.86	11.37	4.47	10.46	3.90	9.13	4.73	11.07	2	2	3.90	9.13	34	34
Bellies	15.04	9.20	13.84	8.47	12.86	7.87	13.24	8.10	29	29	15.04	9.20	1	1
72% trim	2.42	2.49	1.63	1.68	0.96	0.99	1.52	1.57	25	25	1.00	1.03	32	32
42% trim	4.83	2.17	4.32	1.94	3.56	1.60	4.27	1.92	18	18	4.83	2.17	1	1
Jowls	2.27	1.02	1.90	0.86	1.24	0.56	2.07	0.93	13	13	2.01	0.90	15	15
Pork fat	8.81	2.02	7.43	1.70	6.27	1.44	6.95	1.60	28	28	8.81	2.02	1	1
Neck bones	1.61	0.32	1.46	0.29	1.34	0.27	1.49	0.30	14	5	1.42	0.28	24	23
Feet	1.61	0.29	1.27	0.23	0.97	0.17	1.32	0.24	10	6	1.08	0.19	31	31
Scrap/bones	4.74		4.22		3.76		4.01		25		4.07		22	

Range values represent the mean of 25 gilts from an individual farm.
Loads were ranked by grade premium per hundredweight.
72% and 42% trim are defined to be all trim that can be tested to be 72% and 42% lean, respectively.

less retail cuts would show a greater difference in actual value than wholesale cuts. However, retail cuts were not available for our study.

This survey of Kansas pork producers provided insight concerning the value of market pigs when sold on a wholesale cut basis as well as a comparison with pigs from other producers. The two key factors that influence profitability were sort loss and grade premium. The differences in the grade premiums among the farms in this study illustrate the strong financial incentive for producers to raise leaner pigs. A wholesale-cut program would be likely to accelerate the progress of the pork industry toward a leaner retail product.

Figure 6



Data from the 34 farms indicated that grade premium was positively correlated with loin percentage (r = .84).

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