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Introduction

Technology is available for measuring intramuscular fat (IMF) in pigs. Ultrasound processing methods have been shown to provide accurate estimates of IMF in live pigs. The use of real-time ultrasound and image processing algorithms holds economic potential for the swine production industry. This technology, now being developed for the swine production industry, is a noninvasive method of making quantitative measures on the live animal. However, little is known about the costs and returns to producers in implementing pig production decisions/strategies which would increase the level of intramuscular fat. Also, little is known on the costs of implementing ultrasound measurement technology at the producer and/or packing plant levels.



Objectives

This study focused on evaluating the use of real-time ultrasound in measuring the level of intramuscular fat (IMF) in pork. The three objectives were:

- Determine what it will cost producers to produce pork with higher levels of intramuscular fat.
- Determine what it will cost pork packing plants to implement ultrasound intramuscular fat measurement technology.
- Begin assessing consumer willingness-to-pay for pork with improved intramuscular fat.

Table 1
Cost of scanning 20 versus 100 pigs - individual swine breeder.

Expense Item	Rate	Cost Per Pig	
		20 pigs	100 pigs
Mileage (500 mi.)	\$0.55 per mile	\$13.75	\$2.75
Setup Fee	\$50	\$2.50	\$0.50
Equipment Amortization*	\$1.83 per pig	\$1.83	\$1.83
Technology Fee	\$0.75 per pig	.75	.75
Scanning: (20 pigs per hour)	\$65 per hour	\$3.25	\$3.25
Interpretation: (20 pigs per hour)	\$65 per hour	\$3.25	\$3.25
Cost per pig		\$25.33	\$12.33

*Technician scans 2,000 pigs per year.

Methods

Producer cost of producing high and low IMF pork was determined through use of budgeting and the relationship of IMF, feed consumption, feed efficiency, average daily gain, and carcass lean. IMF technology cost was determined through use of capital cost and operating cost.

A consumer willingness to pay experiment (auction) was used to obtain information on the willingness to pay for high IMF pork and low IMF pork. Selected participants were those that typically purchased, prepared and consumed fresh pork. One pound packages of Boneless fresh pork loin chops were used. A taste test was conducted using prepared fresh boneless pork loin chops to determine their preference and willingness to pay for their preferred chop. Participants also provided their preference through visual evaluation of the fresh uncooked chops. Participants were provided \$20 at the beginning of the experiment. Participants were asked to provide a ranking on the cooked chops on a 1-10 scale, which was followed by an auction.

Table 2
Cost of scanning pigs by a large pig breeding company.

Expense Item	Rate	Cost Per Pig	
		5,000 pigs per year	20,000 pigs per year
Technician Annual Training	\$750 per technician	\$30	\$15
Equipment Amortization (7 years life)	1 system per 5,000 pigs	\$73	\$73
Technology Fee	\$0.55 (\$,000 per yr)	\$5.5	\$4.5
Scanning: Hourly Equivalent (20 pigs per hour)	\$65 per hour	\$3.25	\$3.25
Interpretation: Hourly Equivalent (20 pigs per hour)	\$65 per hour	\$3.25	\$3.25
Cost per pig		\$8.08	\$7.83



Results and Discussion

The cost of production increased from \$50.93 per hundred pounds live for the low IMF pig weight to \$51.59 per hundred pounds live weight for the high IMF pig. The low IMF hogs received a \$1.68/cwt live premium in the marketing grid while the high IMF hogs received a \$1.01/cwt live discount in the marketing



grid. The total cost was \$0.66/cwt live higher for the high IMF hogs resulting in a net of \$3.35/cwt live higher cost/reduced income for the high IMF pig. Given the current marketing structure premiums will be needed to encourage breeders to move to higher IMF levels.

Two scenarios were considered when evaluating the producer cost in scanning pigs for IMF. This would typically be done by producers of breeding stock. One scenario is where a scanning company scans pigs for a fee. The second is where a large pig breeding company purchases the scanning equipment. The cost per pig scanned ranged from \$12 to \$25 (Table 1) for the first scenario. The cost for a large pig breeding company ranged from \$7.83 to \$8.08 per pig scanned (Table 2).

Two scenarios were also considered when evaluating the cost for packer 'in line' use of scanning pig carcasses for IMF. One scenario is where the scanning equipment is installed in the plant and all carcasses are scanned. The scanning cost was projected to be \$.58 per carcass scanned. The second scenario was where carcasses are scanned periodically with the equipment brought into the plant. This may be a plant that does a custom harvest for a niche market. For this scenario the projected cost was in the \$2.50 to \$3.00 range per carcass scanned.

Participants ranked the chops according to acceptance, tenderness, juiciness and flavor. An equal number of participants provided a low rank (1-3) for the high IMF and low IMF chop (Table 3). A greater number provided a high rank (7-9) for the high IMF chop. Information in Table 4 shows the average bids for participants who preferred the high IMF chop and those that preferred the low IMF chop. Participants preferring the high IMF chop bid a price of \$2.45 for the high IMF chop and \$1.95 for the low IMF chop, a premium of \$.49 or 25 percent. Participants that preferred the low IMF chop bid a price of \$2.53 for the low IMF chop and \$2.06 for the high IMF chop, a premium of \$.47 or 23 percent.

Table 3
Number of participants providing respective rank on high and low IMF chop.

Attribute	Chop Rank	Chop Type	
		Low IMF Number of Participants	High IMF Number of Participants
Acceptance	Low	11	10
	Neutral	53	41
	High	37	50
Tenderness	Low	11	11
	Neutral	49	42
	High	41	47
Juiciness	Low	9	9
	Neutral	28	23
	High	63	69
Flavor	Low	13	13
	Neutral	46	44
	High	41	43



Table 4
Participant bids for Cooked Chops by Chop Preference.

Chop Preference	Chop Bid by Type		Difference
	High IMF	Low IMF	
High IMF	\$2.45	\$1.95	\$.49
Low IMF	\$2.06	\$2.53	\$.47

Conclusions

Pork in the market place does not currently have intramuscular fat (IMF) information provided. We conclude that there is a good market opportunity for high IMF pork. The premium that participants who preferred the high IMF pork was estimated to be around 50 cents per pound. There are opportunities for market segmentation as those preferring the low IMF pork also paid a premium for that pork.

For pork producers, the cost of producing high IMF pork is approximately \$3.35/cwt live higher than the cost of producing low IMF pork with current genetics and packer grids. Much of the cost (\$2.69/cwt live) is explained by the discounts they receive from the marketing grid given that these high IMF hogs have a lower percent carcass lean. Thus, premiums will be needed for producers to produce high IMF pork. There appear to be opportunities to use this technology to better match consumer wishes with products available.