

# OBSERVATIONS ON AUTOMATIC SORTING

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## ABSTRACT

Automatic sorting technology (AST) is a relatively new concept that is being implemented at many farms today. The concept revolves around using weigh scales situated in the barn such that pigs walk through them, are weighed and automatically sorted aside if they have reached market weight. In so doing, the producer is more confident that pigs are being marketed at their target weight. This technology can have substantial economic benefit, depending on the producer's ability to visually estimate weights and sort pigs, and on the packer's payment schedule. The technology is not without its challenges and requires training for both the producer and the pigs.

## INTRODUCTION

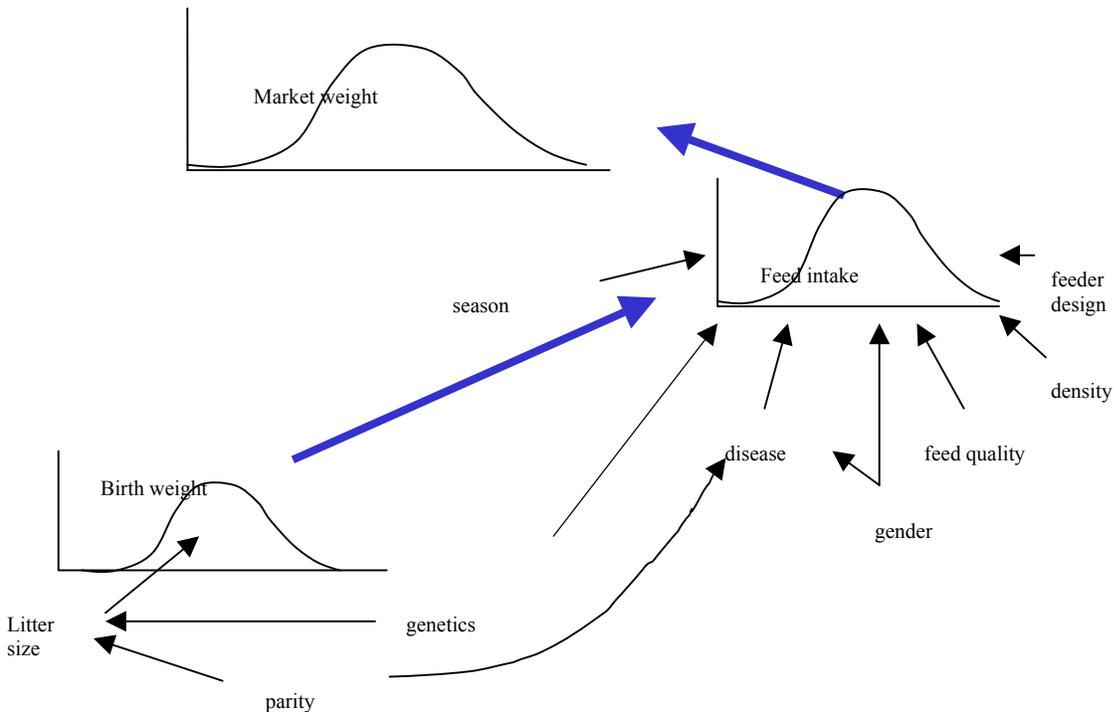
Your packer tells you that the carcasses should be between a certain low weight and a high weight to receive the lowest sort loss and maximum lean premium. But is your packer's target weight for your pigs the same as your calculated target weight? Probably not. So your first challenge is to calculate the optimum weight for your pigs, given your packer's payment schedule.

A second challenge is that there is a major financial difference between attempting to sell between the specification limits that a packer calls for and pursuing an optimum market weight. A Japanese professor named Taguchi demonstrated this to us by use of what is now called the Taguchi loss function. This is a simple, but very powerful concept. There is an optimum market weight where margin is maximized. However because of sorting difficulties and transportation schedules, we usually shoot for a market weight range. Reducing the variability of market weight at slaughter and having carcasses as close as possible to the calculated optimum, represents extra money for you that we usually leave on the table.

What influences variability in market weight? Figure 1, describes the important drivers of variability in market weight. Quality control programs in manufacturing have taught us that it is much cheaper to reduce variability early in the process rather than by rejecting nonconforming product at the end. We experience this in producing pigs. The more variable growth is within a group of pigs, the more difficult it is to manage the selling of those pigs. We know that by reducing sources of variability early in the growing phase, we will reduce variability in weight when the pigs reach approximate market age. Camille Moore has suggested that there are two major drivers of variability at market – variability in birth weight

and variability in subsequent feed intake. We can diagram the variables influencing these two drivers as follows.

**Figure 1. Factors influencing variability in market weight.**

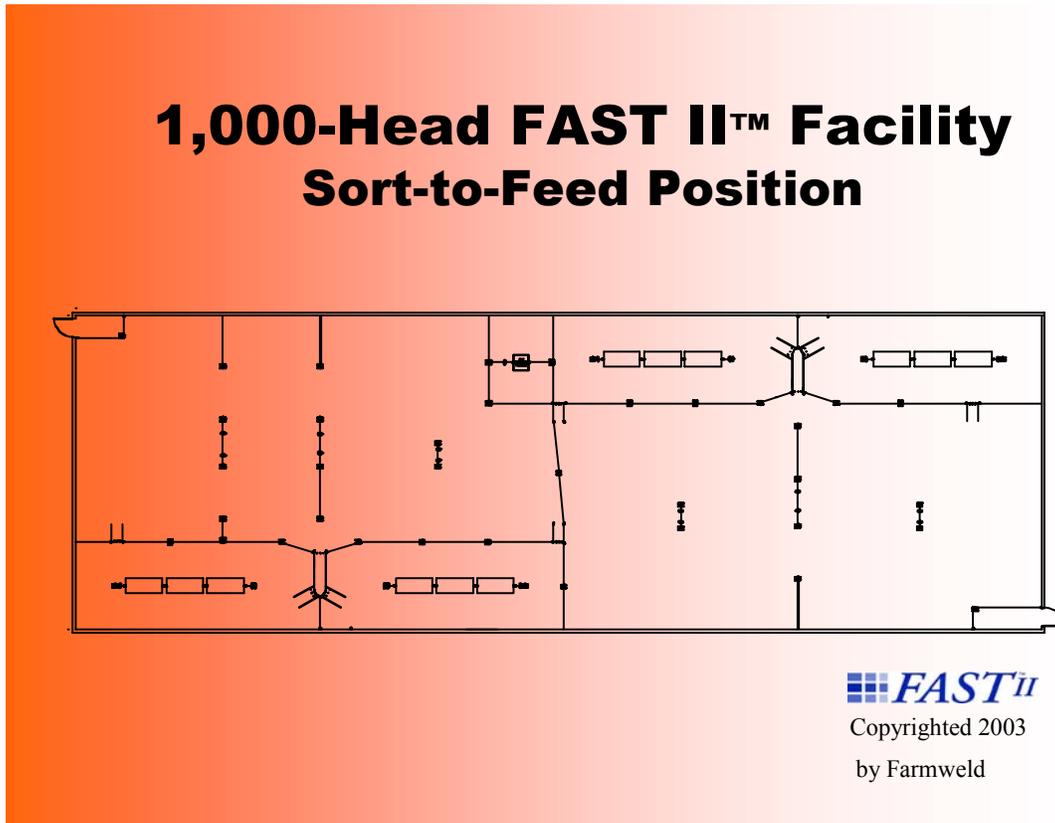


## BENEFITS OF AUTOMATIC SORTERS

Automatic sorting, using an in-pen weigh scale, is an old idea that has been brushed off and is being rejuvenated. What has changed to make this a worthwhile concept to re-visit? Firstly, we now are more comfortable with large pen or group sizes. When I walk through a barn with large groups and automatic sorting capability, I am struck by how calm and approachable the pigs are. Secondly, the packer's specifications for avoiding sort loss are tightening. Margins are ever decreasing making it compulsory that we look for every opportunity to remain competitive.

Basically, the idea of automatic sorting is that a weigh scale is placed in the pen and pigs walk through the scale to get to the feeding area (Figure 2). While there are many possible designs, the barn is often laid out in one or two large size pens (~300-600 / pen). A scale head is attached to the scale and programmed to direct pigs in one of two directions upon exiting the scale – to the feeding area or to the shipping area of the barn. With this system, all pigs weighing at least the cutoff weight will be detected and sorted for shipping. The frequency of automatic sorting and shipping then will dictate the ultimate variability in market weight. It appears that after the producer is experienced, average feed intake and gain can be maintained at historic levels.

Figure 2. Example of barn layout for automatic sorting (kindly provided by Farmweld).



If we had perfect human sorters, this technology would not be needed. But because people vary in their ability, this technology has a role. The reduction in variability and consequent increased margin earned / pig must offset the cost of the equipment plus installation. Some farms may experience labor savings if they are currently spending time weighing pigs to achieve optimal marketing. If a farm is not weighing pigs, there will probably not be labor savings because labor saved in the marketing of pigs is replaced with labor needed to train pigs and assure that they are adapted to the sorting system. Data are beginning to trickle in comparing automatic sorting to traditional barns (Tables 1, 2 and 3).

Early numbers indicate a payback period of approximately 2 years, but this will vary among farms. Other advantages include:

- able to sort to feed light and heavy pigs different diets,
- pigs appear to have less stress at loading for market,
- better space utilization of the barn,
- can have 12-24 hour feed withdrawal,
- less labor for sorting, and
- lower gating costs (offset by cost of equipment).

**Table 1. Data from a Purdue comparison of automatic sorting and traditional barns (no significant difference).**

	No. head	Average Daily Gain	Feed Efficiency	Mortality
Automatic sort	1859	1.84	2.76	4.62%
Traditional	2,474	1.80	2.63	3.05%

**Table 2. Data from one 1200 head wean-to-finish barn in Minnesota compared to traditional.**

	No. head	Average Carcass Weight (lbs.)	Price (including premiums and discounts)
Automatic sort	1150 sold	204	104.9%
Traditional	37,089 sold	199.2	101.6%

**Table 3. Estimated economic value of automatic sorters (Prairie Swine Center, March 2004).**

	Value (\$/pig)
Sort loss reduction (70% core → 90% core)	3.50
Demerit reduction (50% reduced demerits @ \$.75 ea)	0.38
Feed budget by weight (could be \$2.50/pig)	0.00
Phase feeding (could be \$2.50/pig)	0.00
Feed restriction at market (3 kg less feed in last 12 hrs)	0.48
Stocking density, reduced alley & pen divider	0.83
Labor at loading (1.5 person-hrs vs 4 for 240 pigs)	0.16
Less penning	0.53
Less feed auger	0.05
Full slat (slatted floor adds \$30/pig space)	-0.61
Sorter (\$9,000 installed)	-0.55
Net savings	\$4.77

Automatic sorting is not without its challenges. The equipment set-up needs to be done correctly. This includes space allocations, barn layout, and placement of gating. Then, the producer needs to learn how to run the equipment. And finally, the pigs in every group need to be trained. Failure of any one of these 3 elements, and we have a significant added cost, not benefit.

## CONCLUSIONS

In the last 25 years, our industry has gone through revolutionary change brought about by technical and strategic innovations (Table 4). In my view, automatic sorting is a technology that will be added to the list of those having a significant impact on the industry. It will be a classic example where early adopters capture the most economic advantage. Then, as more producers tighten their marketing capability, packers will offer less incentive and more

penalty for missing their specifications. Effective marketing will become an expectation of being in the pork business, and the reward will be remaining cost competitive.

**Table 4. Technical and strategic innovations in the swine industry.**

Technical innovations	Strategic Innovations
Batch farrowing and all in, all out pig flow	Production contracting
Lean genetics	Vertical integration
AI	Market contracts
Parity segregation	Differentiation of pork products
Effective marketing	