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Wean-to-Finish construction alternatives, management, and performance

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Introduction

Pig flow has long been recognized as important for optimizing health and performance. Wean-to-finish facilities allow all-in, all-out flows by building in many current sized US swineherds. This flow allows traditional herds to capture more of the economic benefits of multi-site flow and allows sow herd integrity straight-line flow in multi-site systems.

Wean-to-finish animal flow has been reported previously.^{1,2,3} This flow eliminates the nursery facility and grows the pigs from weaning to slaughter in the same facility. This alteration in animal flow is becoming an accepted change as the economic efficiencies and management advantages are realized. Previous papers^{1,2,3} have identified some of the advantages of wean-to-finish pig flow. These include improved average daily gain, reduced mortality, reduced culling, reduced transportation, and reduced labor for cleaning and disinfection. Other advantages now being realized include improvements in logistics of feed deliveries, data group integrity, and straight-line flow of pigs from sow units maintaining integrity.

Design

The wean-to-finish facilities have previously been reported.^{4,5,6,7,8} During the past year changes have occurred to incorporate a standard but flexible design and large pen capacity. This evolution has resulted in two common designs:

- Farmweld Millennium Design™
- Outer wall alleyway

Both of these designs are configured to utilize the zone heating provided by infrared heaters more efficiently, alleviate the discomfort of tube ceiling infrared heating located in the center of the building, and increase the capacity per pen. The basic structure and equipment for both designs remain standard when compared to the typical Midwestern finishing facility. This typical barn has dimensions of 40 feet by 200 feet with a capacity of 1000 head at 7.2 square feet per head. The barn will either be shallow or deep pit depending on environmental management. Ventilation is natural, tunnel, or a combination de-

pending on geographical location, utility rates, and performance. The flooring is total concrete slats with standard 1-inch slots. The feeders are standard dry or wet/dry. The waterers are standard cups or nipples.

In the Farmweld Millennium Design, (the pens are initially located in the center of the building occupying what is traditionally the center alleyway in the standard building. This allows the tube or pen infrared heat to be located here but avoids humans being underneath it during the high temperature requirements. It also keeps the pigs away from the exterior walls of the building, thus avoiding housing pigs upon entry adjacent to cold surfaces. The pigs are housed in the southeast center pens until the traditional nursery period of 8–10 weeks and then pens conforming to the standard center alleyway are established. This system uses the two different gating configurations, i.e., nursery phase (wean position) and finishing phase (finish position) with the same interchangeable gates. The design allows this to be easily and conveniently accomplished. This design is attractive for producers because it can accommodate design capacity ranging from the traditional 25 pigs per pen to 200 pigs per pen

In the outer alleyway design, the alleyway is located along one side of the standard building. The pen dimensions are typically 19 feet by 38 feet. The outer alleyway design also utilizes zone heating more efficiently and alleviates the inconvenience of an infrared tube over the center alleyway. This design must accommodate at least 100 pigs per pen to allow practical pen dimensions for normal pig movement. The tube or brooder infrared is located in a designated warm zone of the pen. The alleyway is usually located on the south to allow the natural sunlight to provide some comfort and the cooler north wall to help establish the dunging pattern. In this design it is also possible to locate the alleyway gate further into the pen during the nursery phase to restrict the pen area but if the alleyway is located on the south this will remove this advantage. This design requires larger inventories of pigs entered per week because of the inherent pen size dictated by pen dimensions. The long pen dimension makes it impractical to utilize pens widths less than 19 feet.

TABLE 1: Comparison of Farmweld Millennium Design¹⁰ and Outer wall alleyway for a 40'2" X 196' I.D. building⁹

	Feeders #/size = \$	Waterers # cups = \$	Gating 1. ft. = \$	Flooring
25 Pigs/Pen	20/42" (3H)	80 W/F Cups	1,034'6"	
2 Rows-20 Pens/side Center Alley	\$6,194.00	\$3,600.80	\$9,053.16	
25 Pigs/Pen	20/42" (3H)	80 W/F Cups	1,026'5"	\$9,210.60
Millennium Design Wean & Finish	\$6,194.00	\$3,600.80	\$9,915.93	
50 Pigs/Pen	20/42" (3H)	40 W/F Cups	829'2"	\$9,210.60
Millennium Design Wean & Finish	\$6,194.00	\$1,800.40	\$8,321.85	
100 Pigs/Pen	20/42" (3H)	40 W/F Cups	733'	\$9,210.60
Millennium Design Wean & Finish	\$6,194.00	\$1,800.40	\$7,160.72	
100 Pigs/Pen	10/70" (5H)	40 W/F Cups	590'6"	
1 Row/Pens Alley-North Side	\$4,538.10	\$1,800.40	\$5,754.30	

Stainless Steel Wean/Finish Water Cup w/54" SS Straight Pipe.

Plastic flooring in Millennium Design – 1,500 sq. ft. Cost of concrete slats should be deducted for actual cost. (1,500 sq. ft X 2.20 = \$3,300.00; \$9,210.60 – 3,300.00 = \$5,910.60)

These prices are an estimate and may vary on actual project.

Table 1 illustrates cost comparisons of the two designs with varying capacities.

Increasing the pen capacity to greater than 30 pigs per group¹⁰ is utilizing data that suggests a lower social stress between pigs from removals and resocialization. The larger pen capacity reduces gating costs and may reduce feeder costs slightly. This flexibility allows producers to move toward larger pen capacities as data supports this change. This design also allows incorporation of sections of plastic flooring more economically than the original design.

It has been theorized that the increased pigs in a group actually facilitate the training at eating. This is substantiated by the reduction in cull removals in wean-to-finish compared to the standard building, but more data needs to be collected to confirm this.

The larger pen dimensions allow locating the feeder in the center of the pen. This forces the pigman to enter the pen to observe adjustment and pigs. This location allows attachment of short gates (4 foot) for supporting the waterers and establishing an area to rest from other pigs during aggressive social periods. This racetrack design is seemingly beneficial in reducing within-pen aggressiveness.

Cup waterers are most commonly installed. These cups have been shown to reduce waterer wastage,¹¹ thus lowering water, waste, and medication costs. Recently a new cup has been designed (Drink-O-Mat[®] to handle pigs from

7 to 280 pounds. This cup is wider and taller than the original cup and accommodates heavy slaughter animals without requiring adjustment. These cups are installed at a height of 4 inches.

Operation

Piglet starting weights of 9 pounds or less are common, similar to the conventional systems. Assuming normal distributions, 2.5% of the pigs should be <5 pounds and 13.5% between 5 and 7 pounds. Pigs are sorted by size and gender on entry. When pen capacity increases, implementing sizing into the categories of light, medium and heavy may allow a wider weight variation within a single pen. The barn is prepared for pigs prior to arrival. Barns or rooms are cleaned, disinfected, and allowed to dry. Feeders, gates, etc., are reassembled. Comfort mats are placed under the heat zone. The actual location depends on the location and type of heater and pen design/dimension. An additional comfort mat frequently is located in front of the feeder to minimize leg injuries especially in barns that have slat surface erosions. The zone temperature is set at 82°F for the first week and ramped down 7 degrees per week after the first week. Producers using heat lamps frequently suspend two 250 watt lamps in the heat zone for one week and utilize one for the remainder of the required period. Pigs are observed with respect to their environmental comfort and adjustments made. However, one of the advantages of zone heat is the ability to provide piglets the choice to seek their individual com-

fort zone. Barns utilizing heat lamps or infrared brooders operate barn heaters after the heat lamps or infrared heaters are removed after 8–10 weeks.

Pigs are allowed free access to the pen. Usually pigs discover the waterers very quickly when scouting the pen. With cups, run a reservoir of water in the base of the cups to attract discovery. With nipples, allow drippage for at least 72 hours. Tube wet/dry feeders have a faucet installed that is opened for dripping. Pigs are allowed immediate access to the feeders. Only a daily consumption feed volume is placed in the feeder. This is managed by placing an adjustable tube over the normal discharge tube of the feed system. Pigs are fed three times per day on the comfort mat similar to management of the conventional nursery. However, with proper feeder access, this is not necessary and does not improve average daily gain in many groups. Feeding on mats may however, improve pig observation and thus have additional benefits. With large pen capacity, the producer must be careful not to feed excessive amounts of the first starter diets since there is a necessity to feed the lightest weight pigs. This problem is size dependent and small herds manage this by retaining 2–4 pens of traditional pen capacity (20–25 pigs). Comfort mats are removed after 3–6 weeks depending on pig weight, season, pit depth, pen dimensions, and ventilation. The pigs are observed to indicate removal time. Pigs are observed thoroughly twice daily. Individual pigs are treated as necessary. Only pigs with non-responsive health challenges, severe lameness, or markedly reduced growth rates are removed to the treatment pens. Pens are not sorted for size at any stage of growth. During slaughter removals, gating is aligned to facilitate sorting and loading.

Remodeling

Standard finishing facilities can be remodeled to wean-to-finish. The buildings are generally acceptable with the addition of zone heat. Gating modification depends on the spacing of the existing gating or whether the height can be adjusted to the floor. Feeders may need to be replaced depending on the style and accessibility to wean

pigs. Cement slats with excessive corrosion are repaired with cement patch or a comfort mat placed directly in front of the feeder.

Performance

Table 2 illustrates performance data from a wean-to-finish system and compares it to the same system's three-site performance.

Financial

Several authors have used models to evaluate the cost benefit of wean-to-finish buildings. The most consistent performance is an improvement of days to market. Authors 12 using a spreadsheet model have showed that wean-to-finish facilities had a 57% operating efficiency and an 18% return on assets compared to 51% and 16% for a conventional system, respectively.

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TABLE 2: Wean-to-finish performance compared to conventional system

	Conventional (Combined)	Wean-to- Finish
Pigs Entered	26,098	26,488
Mortality %	8.42	3.2
Entry Age (days)	14	14
Entry Weight (lbs.)	9	9
Market Weight (lbs.)	259	268
Days to Market	190	185
Average Daily Gain	1.32	1.40
Feed Conversion	2.72	2.66

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