

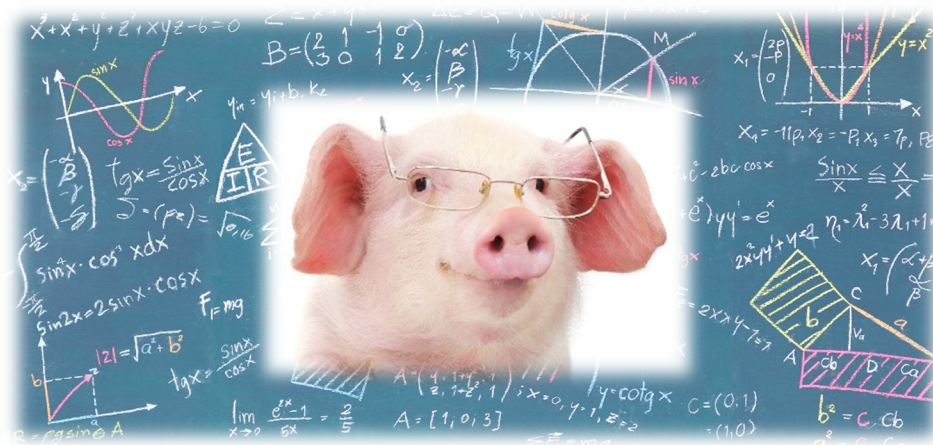


Pig Improver



Is Your Math Correct?

Calculating the right air exchange to maximize your herd



Optimizing ventilation is a matter of accurately setting up fans and inlets to maintain ventilation levels that meet the needs of your pigs.

However, to set up those fans and inlets properly, your targets for minimum CFM (cubic feet per minute) of air volume movement in the barn, must be accurate.

In today's Pig Improver, we focus on minimum ventilation. However, concepts and calculations can be applied for later stages as maximum ventilation is approached. With maximum ventilation, the goals change to moving a greater volume of air at a higher rate, to control temperature rise.

Are you doing your calculations correctly? Read on to check your math with PIC.

Minimum Ventilation (MinV)

Minimum Ventilation (MinV) calculations will be discussed below. It is important to note that systems should be set-up to never drop below these air exchange rates. **These are the absolute minimum.**

MinV CFM recommendations are based on the minimum amount of air that should be exchanged to control humidity and gases.



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As barns warm up during the summer months or as pigs grow, our goals shift from ventilating to control gases and humidity to removing hot air for temperature control.

Minimum Ventilation

Days on Feed	Weight	Winter CFM
1	12 lbs (5.4 kg)	2.0
8	15 lbs (6.8 kg)	2.0
15	19 lbs (8.6 kg)	2.0
22	24 lbs (10.9 kg)	2.0
29	31 lbs (14.1 kg)	2.2
36	41 lbs (18.6 kg)	2.6
43	51 lbs (23.1 kg)	2.9
50	62 lbs (28.1 kg)	3.3
57	73 lbs (33.1 kg)	3.9
64	86 lbs (39.0 kg)	4.5
71	100 lbs (45.4 kg)	5.1
78	113 lbs (51.3 kg)	5.4
85	127 lbs (57.6 kg)	5.9
92	142 lbs (64.4 kg)	6.6
99	156 lbs (70.8 kg)	7.1
106	171 lbs (77.6 kg)	7.8
113	186 lbs (84.4 kg)	8.5
120	200 lbs (90.7 kg)	9.2
127	215 lbs (97.5 kg)	9.9
134	230 lbs (104.3 kg)	10.6
141	243 lbs (110.2 kg)	11.2
148	258 lbs (117 kg)	11.9
155	272 lbs (123.4 kg)	12.6
162	284 lbs (128.8 kg)	13.3
169	297 lbs (134.7 kg)	13.9
176	310 lbs (140.6 kg)	14.6

However, our ventilation systems should operate in minimum ventilation anytime room temperatures are below or within the first bandwidth set point (1.0-2.0°F, depending on season).

First, we must remember that MinV CFM rates increase as pig weights increase.

Using the table above, let's check calculations of CFM for a barn in the winter containing 1,250 weaning pigs, each weighing 12 lbs/5.45 kg. The chart indicates a MinV winter CFM for pigs that size of 2 CFM.

$$1,250 \text{ pigs} \times 2 \text{ CFM/pig} = 2,500 \text{ CFM}$$

during minimum ventilation

For 1,250 market pigs of 300lbs/136kg, minimum CFM is 1,250 pigs X 14 CFM = **17,000 CFM**.

The above calculations in the minimum ventilation chart help us define our **Pig Needs**.

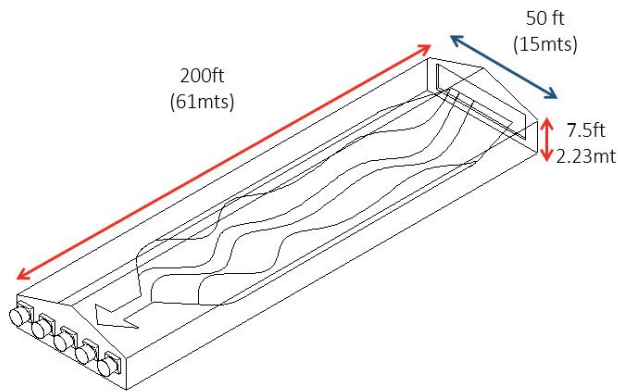




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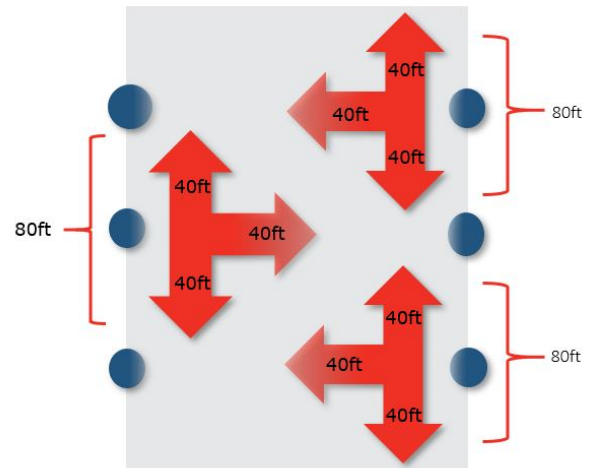
Fan Speed

For the same two size scenarios, let's assume the barn has two sets of three 18-inch fans **with a maximum fan capacity each of 3,600 CFM**. Total barn fan capacity is therefore 21,600 in two sets of 10,800 CFM: 2 X (3 X 3600 CFM) (see diagram below).



● 18in@ Variable Speed Fans=3,600CFM

To cover the barn we need at least 3-18in fans x 3,600CFM each
Total 10,800 CFM



When determining which fans to operate, it is important to note that **fans have different coverage** area, therefore use your air speed meter (anemometer) to verify the fan is capable of extracting **desired** air from the furthest inlet.

From our calculations above, we know that 1,250 weaning pigs have a minimum ventilation need of 2,500 CFM. We divide our requirement by total capacity to get our fan speed:

2,500 CFM Required

10,800 CFM total fan capacity = requires fans to work at 23% of their capacity

For 1,250 market pigs that require 17,000 CFM, three fans won't have enough capacity to achieve their minimum ventilation needs (as three fans will only provide 10,800 CFM). Therefore, we need to work with a second set of three fans, so let's use six fans for this example:

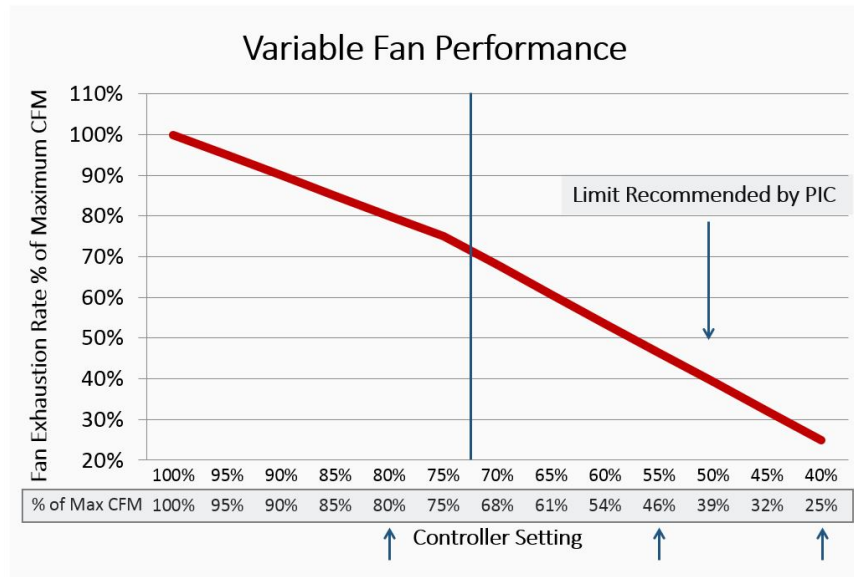
- Six (6) fans provide 21,600 CFM at maximum
- To achieve 17,000 CFM, we need to work at 79% fan capacity (17,000/21,600)



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Fan Setting on Controller

For the same two scenarios, let's look at fan settings at the controller. Please use the following graph for reference:



It is important to note that once fan settings drop below 75% at the controller, an increasing amount of fan efficiency is lost. *Example: 50% at the controller = 39% real extraction rate*

From our calculations above, for weaned pigs, we need fans at 23% extraction rate. However, PIC does not recommend operating fans at less than 50% at the controller.

For market pigs, fans should run at 79%. That's a speed of 79-80% at the controller.

Fan exhaustion rate should always be reviewed by your supplier, we are only showing reference numbers here.

Inlet Openings

Above, we defined **Pig Needs** and determined **Fan Settings** to match those needs.

The final step in the process is **setting the inlet opening correctly to achieve the desired air speed (std. 600 to 800 FPM) from each inlet** to assure good coverage and ideal mixing of fresh air as stale air is extracted.



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For reference, here are three useful tables:

Fan Capacity Reference

Fan Size	CFM	CFM Output
8	450	500
10	1100	1200
12	1500	1600
18	3500	3600
24	5700	6000
36	9700	10000
48	17000	18000
50	22000	23000
55	23000	24000

CFM / Pig Reference

Days on Feed	Weight	Winter CFM
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Variable Fan Performance Reference

Set Point Speed	Real Capacity
100%	100%
95%	95%
90%	90%
85%	85%
80%	80%
75%	75%
70%	68%
65%	61%
60%	54%
55%	46%
50%	39%
45%	32%

Winter or summer, you can manage ventilation properly as you strive to maximize performance of your PIC pigs.

If you need more information or guidance with your calculations, please reach out to your PIC account manager.

Our future – and yours – has never looked so bright, as PIC continues to deliver on our promise to **Never Stop Improving.**