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Poultry Housing Tips

Timer Fan Electricity Usage

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Controlling minimum ventilation fans with five- or ten-minute interval timers has proven over the years to be a very effective way of controlling air quality and temperature as well as minimizing fuel usage during cold weather. An interval timer provides a grower a high level of control at a minimal cost. Think for a minute how you would ventilate a house during cold weather without exhaust fans controlled by a timer. Negative pressure ventilation would not be practical. If you ran one fan constantly, a static pressure probably could not be generated, resulting in the fan providing fresh air in only the immediate vicinity of the fan. Even if you could obtain a static pressure with a single fan, it would provide too much fresh air for young birds and not enough for market-age birds. You could run two or three fans and obtain a static pressure, but this would be too much fresh air for all but the oldest birds during mild weather. Of course, you could turn off the fans and rely on a cracked curtain for ventilation and give up virtually all control over air temperature, air quality and fuel usage. Bottom line: exhaust fans on interval timers give the producer control over just how much air enters and help to insure that enough fresh air is brought into a house on a regular basis to control moisture, ammonia, and dust. At the same time, they help to keep fuel usage down with minimal cost and effort.

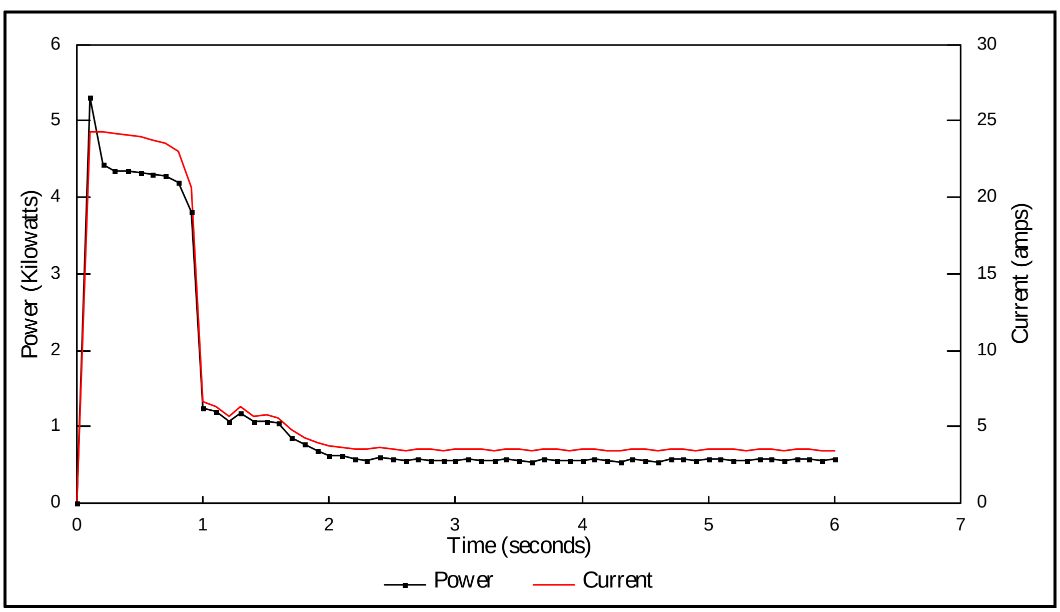

Figure 1. Starting Current and Power for a Standard 36" Fan.

One concern expressed by growers about controlling exhaust fans with interval timers during cold weather is electricity usage. The constant cycling of fans on and off is often associated with high power usage. The concern probably stems from the fact that during starting a fan will draw three to eight times the amount of current it will draw during normal operation. For example, a 36" fan with a 1/2 h.p. standard efficiency motor will draw approximately 3.5 amps when running. During start-up the same motor will often draw over 25 amps (Figure 1).

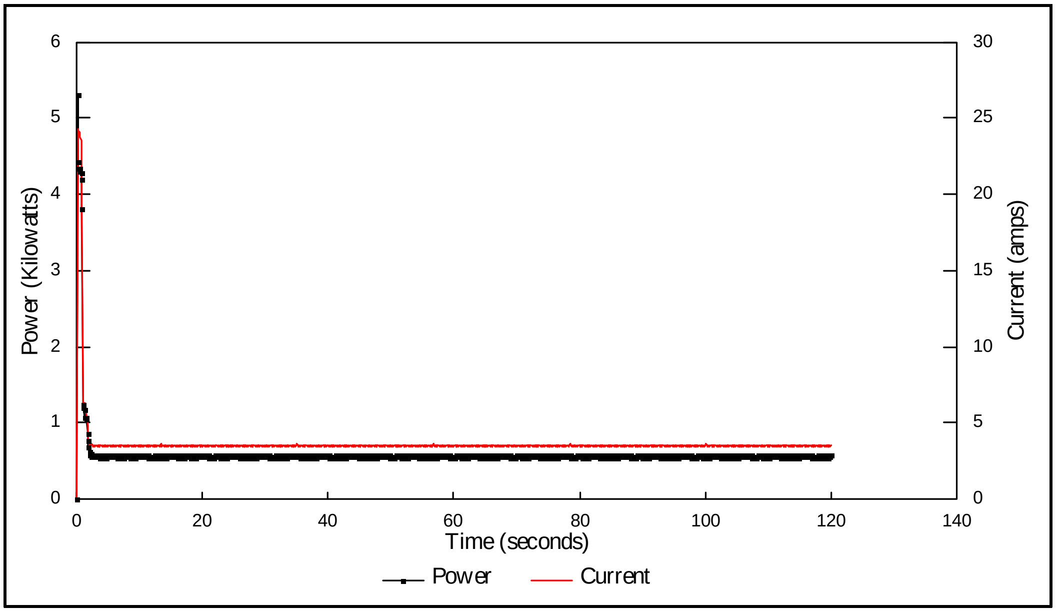

Figure 2. Current and Power Usage During a Two Minute Fan Run

As you might expect, the increase in current draw is due to the fact that the greater the load a fan is under the more current, and therefore power, a fan will use. Even the amount of static pressure in a house has an effect on current draw. For example, a 36" fan will draw 5 to 10 percent more current when working under a static pressure 0.10" compared to a similar fan (stirring fan) working under nopressure (2.40 amps vs 2.25). But, starting a motor requires the greatest amount of current because it is very difficult for a motor to go from standing still to over 1,700 revolutions per minute in just a few seconds.

Even though starting a fan requires a large amount of current, and therefore power, this does not necessarily translate into high electricity costs. This is because electricity bills are not based only on how much power is used but also on how long that power is used. Power companies typically charge somewhere around eight cents per Kilowatt*hour of electricity (1 Kilowatt = 1,000 watts). This means that if you have a motor that uses 1,000 watts of power and it operates for an hour you will be charged eight cents. If the motor runs for two hours, it will cost you sixteen cents and so on.

Starting a fan costs less than many think because even though the fan uses a large amount of power during starting, the actual starting process takes less than a few seconds. The exact cost of starting a 36" fan can be calculated by multiplying the power used during starting by how long it takes to start the fan (about one second for a belt-driven fan, see Figure 1), by the cost per Kilowatt*hour.

Electricity Cost = Power X Time X Rate
*= 4.5 Kilowatts X 0.000278 hrs (1 second) X $0.08 per Kilowatt*hr*
= 0.01 cents

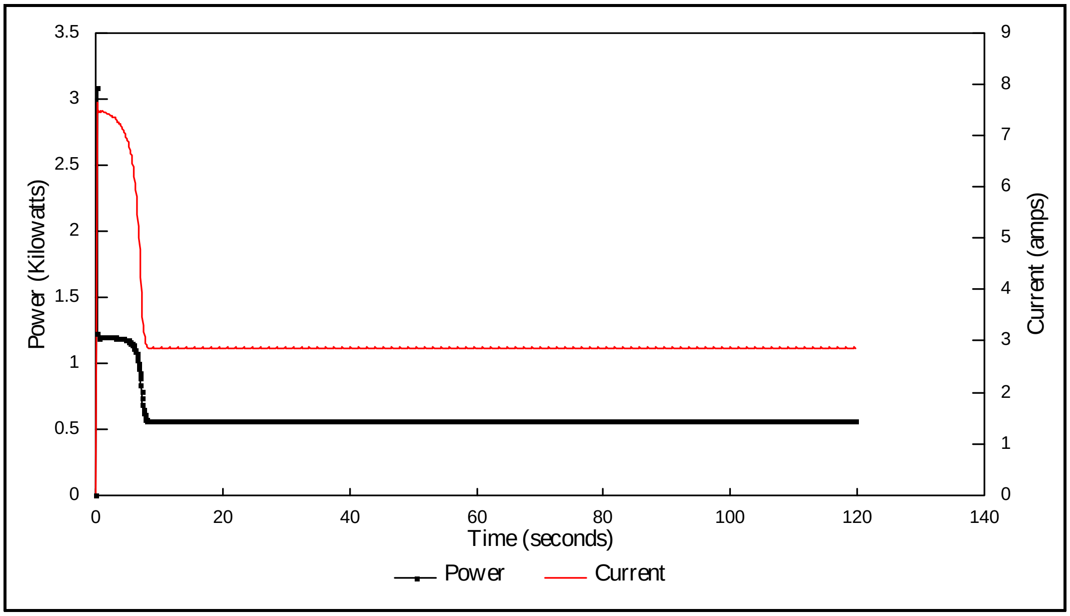

Figure 3. Current and Power Usage During a Two Minute Fan Rn (Direct-Drive 36" Fan)

Figure 1 shows the current and power usage of a motor over the first few seconds of operation. Figure 2 shows current and power usage over a two-minute period. As you can see, even though the initial power usage is relatively high, the average power usage over the entire two-minute period is relatively low. In other words, the average power usage of the fan during the two minutes it operates is not affected significantly by the high power usage during starting because it is so short in duration as compared to the relatively low power usage during the remainder of the two minutes the fan is running. Bottom line: over a 24-hour period, it would cost approximately 24.1 cents to operate a direct-drive 36" fan one minute out of five. If the same fan were to run 288 minutes continuously, the same as one minute out of five for 24 hours, it would cost 21.7 cents.

What about direct-drive fans? Though direct-drive fans take longer to start (six seconds vs. one second), the starting current is significantly lower, eight amps versus forty (Figure 3). The net result is that, like the belt-driven fan, total power usage of a timer fan is not affected very much by starting power. Over a 24-hour period, it would cost approximately 24.3 cents to operate a direct-drive fan one minute out of five. Whereas, if the same fan were to operate 288 minutes continuously, it would cost 21.5 cents.

So when it comes to operating timer fans, don't be concerned about power usage. The little money you spend each day will be more than offset with savings in fuel usage and improved bird performance.

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