

REPAIR AND MAINTENANCE OF THE POULTRY FACILITIES

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Introduction

Most of the time farm maintenance is approached with the “If it ain’t broke, don’t fix it” mentality. Yet we know that preventative maintenance is the key to a smoothly running poultry operation. Obviously, maintenance of operations should be in a proactive mode. It should be as much a part of the daily farm routine as feeding birds. But many times this preventative maintenance takes a back seat to production issues. In most cases, there are not enough maintenance personnel to complete the tasks effectively leading to costly downtime. Production and maintenance should go hand in hand to maximize performance.

The age of a farm greatly affects the overall farm budget. As farms age, more emphasis should be focused on necessary repairs. What do you do if important problem areas are being overlooked and production declines because the maintenance department/farmer owner cannot keep up with the increase workload?

Question: Do you hire maintenance personnel to handle the load?

This method involves more trucks, tools, insurance and training. This solution addresses the immediate problem. It does not solve the continuing problem of increased maintenance due to facility age and neglect.

Question: Should poultry farm managers take time out of their busy production schedule to do necessary maintenance on the farm?

This is a controversial issue and there are pros and cons for this approach.

This presentation will cover farm workers’ involvement in maintenance procedures. Various levels of worker involvement will also be discussed. Typically the question asked about this topic is: at what point does farm workers’ involvement in maintenance task interfere with production? Another frequent comment by farm managers is, “when it comes to mechanical or electrical problems, I do not have a clue how to fix it.”

Addressing these problems becomes part of the company/farm policy. Training may be necessary to increase skills in certain areas. A farm plan must be established. Maintenance tasks must be delegated and guidelines must be set on employee involvement.

In cases involving farm budgets, employee recognition and/or compensation for a job well done will provide an incentive to do more and do it better.

Problem Areas/Overlooked

This portion of the presentation is labeled “problems areas overlooked.” I use this term because most of the solutions to our problems are basic and overlooked. In our day-to-day routine we overlook the obvious solution to most problems. As we review these problems, ask yourself the question, “Could we do a better job maintaining or checking this area on our farm?”

Replacing Worn Fan Belts

One of the most neglected machines on a poultry farm is the fan. They run many days, months, even years, non-stop. We clean them occasionally, but never stop to inspect them. We assume if the blades are turning, the correct amount of air is being expelled from the building. Replacement of worn belts and pulleys are essential for the correct amount of air to be moved through the house to cool the birds.

Example: “It seems like every summer the ambient temperature in the barn increases. I think the farm needs to install bigger fans.”

A simple solution to this problem could be proper maintenance of the existing fans.

Explanation: A worn belt on a 48” fan could wear into the pulley resulting in a loss of fan blade speed of approximately 50 rpm. This slight reduction in air movement results in the fan moving approximately 20% less air. (Czarck, Lacy)

The tables below show the difference in the amount of movement between a 3.0” meter pulley and a 2.7” motor pulley.

This difference in pulley size resembles a worn pulley.

Table 1. Fan A with 3.0” motor pulley (470 rpm) (*The University of Georgia Cooperative Extension Service*)

Static Pressure	Air Moving Capacity	Tunnel Air Speed
0.00”	23,800	528
0.05”	22,700	504
0.10”	21,600	480
0.15”	20,300	451

Table 2. Fan A with 2.7" motor pulley (425 rpm) (The University of Georgia Cooperative Extension Service)

Static Pressure	Air Moving Capacity	Tunnel Air Speed
0.00"	19,800	440
0.05"	18,500	411
0.10"	17,100	380
0.15"	15,300	340

Curtains and Cables

Are all of your curtains straight a level from one end of the house to the other? Do you have a scheduled maintenance time for adjusting curtains? Do you have a problem with curtain cables breaking?

Fact: Most cable breaks are due not to insufficient cable strength, but to improper matching of cables to pulleys.

Fact: A curtain machine may adjust a curtain opening a hundred times a day.

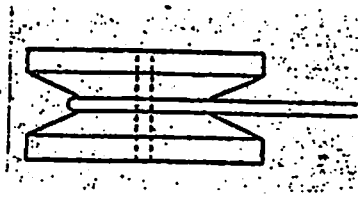
Fact: Sections of the cable are being bent thousands of times each month.

Example: Bending a wire back and forth can cause it to break. A cable is more flexible than a single strand of wire, but continues bending around a small pulley can cause stress and wear. The larger the cable pulley, the less likely a cable is to break. It is not bent as far each time around. The outside strands of cable around a pulley receive the most stress and wear. The excessive stress is achieved through a continuing stretching process.

Studies have shown that by doubling the pulley diameter, cable life can be increased by up to thirteen times. When small pulleys are used, cables tend to just slide over the surface of the pulley not turning them and thus causing uneven wear, which can result in premature breakage. (Czarck, Lacy)

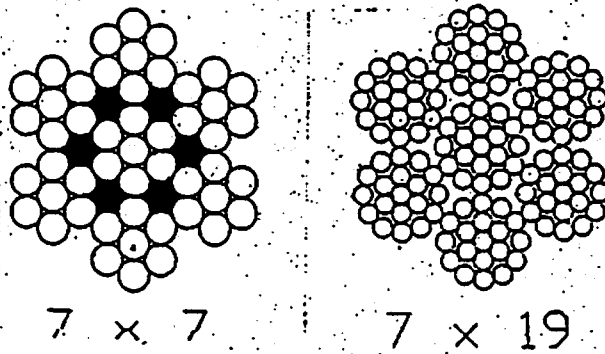
Cables and pulleys must be properly aligned. Just like the belt alignment on a fan, the cable must feed directly into the groove on the pulley.

Figure 1. Proper Pulley and Cable Alignment (*The University of Georgia Cooperative Extension Service*)



Cable flexibility depends on the makeup of the cable. A 7 x 7 cable is less flexible than a 7 x 19 cable. See Figure 2 below.

Figure 2. Types of Cables (*The University of Georgia Cooperative Extension Service*)



Manufacturers suggest a 7 x 7 cable should have a pulley diameter that is a minimum of 42 times the diameter of the cable. A pulley for a 7 x 19 cable should have a diameter at least 25 times the cable diameter. The table below shows suggested pulley diameter.

Table 3. Minimum Pulley Diameter for Various Cable Types and Sizes

Cable Diameter	Minimum Pulley Diameter (inside diameter)	
	7 X 7	7 X 19
1/16"	2 5/8"	-
3/32"	4"	-
1/8"	5 1/4"	3 1/8"
5/32"	6 5/8"	3 7/8"
3/16"	7 7/8"	4 3/4"
7/32"	9 1/4"	5 1/2"
1/4"	-	6 1/4"
5/16"	-	7 7/8"
3/8"	-	9 3/8"

- Questions:
- Is someone on your farm trained to adjust curtain height?
 - Can someone on your farm properly tie a curtain rope to a curtain cable?

Reduce Curtain/Louver Leakage

How much does a leaking sidewall curtain affect production? Poultry production can be measured by an increase in feed consumed to stay warm. This relationship is relative to the amount of cold weather during the period of curtain leakage.

Keep curtains tied up and level. Sagging curtains cause cold spots in the building. These cold spots cause extreme stress on affected birds. Another way to reduce cold spots in curtain sided buildings is keep curtain straps tight. Strong wind can open the curtain from the top edge letting valuable heat escape outside. These minor adjustments can help alleviate many future problems and help decrease energy loss.

Evaporative Cool Cell Efficiency--Summer Maintenance

Maintenance of evaporative cooling systems is essential to achieve peak performance. Regular observation and cleaning of the surface of the pad is essential. A combination of the items listed below could cause a 15 to 20 percent reduction in pad effectiveness.

Preventive Maintenance Checklist:

- *Replace System Filters:* Evaporative cool cells get clogged with algae and debris from the sump. Correct the problem by covering the sump and changing the filter regularly. Also, keep the filter covered to help prevent algae growth. (Paint black)
- *Check Bleed Off:* Proper bleed-off will reduce mineral deposits from collecting on the pad and limiting water flow.
 - * Recommend rate one gallon per hour per lined foot of pad.
- *Check Distribution Pipe Holes:* Clogged holes in distribution pipe causes dry spots on the evaporative pad. These dry spots greatly reduce the pads cooling potential.
 - * Make sure holes in distribution pipe are turned upward.

Typical Evaporative Cooling Problems:

- Poultry barn
- Cool cells near feed bins/dusty feed/road dust accumulation on pad.
- Filter not changed until system slows.
- Distribution line holes are half stopped.
- Pads have not been washed.
- One third of the pad has dry spots.

Example: Pads efficiency reduced by 20%

Dry Bulb Temperature	90°
Wet Bulb Temperature	<u>75°</u>
	15° Difference

Good Clean Pad	
75% Efficient	11.25° Potential Cooling
Poorly Maintained Pad	9° Effective
20% Less Efficient	

The potential for cooling birds in this farm example is reduced by 2.25 degrees F. This problem could have been avoided by maintaining the evaporative cooling equipment. This difference may seem minor on a moderately warm day of 78°F, but a drop of 2.25°F on a 88° day could divert stress problems on grown birds. Every little decrease in temperature helps decrease stress.

Ventilation Maintenance of Fan Shutters and Blades

Routine cleaning of fan shutters and blades is a simple process, but overlooked on most farms. Routine fan cleaning should be put on the farm's high priority list especially in the summer months. Dirty fan shutters and blades could reduce the air moving capacity by 20 to 30 percent.

Example: **Summer Cooling of the Poultry Barn**

Typical Farm	
Size:	4 – 48" inch belt drive fans
Total cfm:	4 x 14,000 =
Summer Requirement	
Total Building:	56,000 cfm
25% Reduction in	14,000cfm
cfm =:	<u>42,000 cfm</u>

This problem can be easily corrected by routine cleaning. If this problem persists, evaporative cooling process can be greatly reduced on hot days. The example above shows a 25% reduction in fan efficiency. This problem could nullify the air movement from one of the 48" fans (*See example 14,000 cfm*). An extreme spike in temperature coupled with reduced fan performance could create stress on birds resulting in disease proven problems and a decrease in production. Poultry management is closely associated with stress management.



Figure Fan Cfm's

Formula Square Feet of Fan

Area = Radius²
 Area = 3.14 x Radius
 Area = sq/in
 ft/min
 144
 A = Square Feet of Fan Space
 *144 Cubic Inches = 1 Cubic Foot

Example: Area of a 48" Fan

A = R²
 3.14 x 24² in
 3.14 x 576
 A = 1808.64 sq in
 A = 1808.64
 144
 A = 12.56 sq ft

Formula Quantity of Air Produced

Q = A x V
 Quantity = Area x Velocity
 Q = Fan Size sq/ft x Velocity

 Quantity of = Cubic ft/min
 Fan Discharge

Example: Quantity of Air Produced by 48" Fan

Q = A x V
 Q = 12.56 sq ft / 1,850 ft min
 Q = 23,236 Cubic ft/min

Each farm must analyze their maintenance needs and commit to a set of standards that keep their farm operating at peak performance.

Points To Remember

- Determine the level of employee involvement in farm maintenance.
- Determine the level of maintenance skill needed by farm managers.
- Develop a farm Maintenance Plan.
- Determine how workers will receive training on facility repair.
- Determine which tasks farm employees should perform.
- Do not overlook the basics.
- Machinery wears out and breaks. The older the farm becomes the more repairs are needed.
- Equipment replacement cost is high. Maintenance of existing equipment is cheaper. (??)
- A poultry manager should possess people skills, production skills, mechanical skills, and basic electrical skills.

Take Home Message

It makes no difference if your business is big or small, or if you are comparing one farm to another. The bottom line is how much does it cost to raise A bird.

There are certain costs that are uncontrollable in poultry production. Good managers look for ways to cut cost without reducing production. On farm maintenance and repair should be examined closely when considering ways to decrease farm expenses. There are some upfront costs associated with maintenance. These include training, equipment, and tools. The benefits far out weigh the initial cost.

Poultry companies and individual farms must commit to total farm production package. This package must include ways to reduce on farm maintenance costs and maintain steady production.

*The bottom line is not how much money you make, it is how much you SAVE!!
Where can you save money this year?*

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