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Generator Maintenance for Reliable Backup Power on Farms

By: Dr. Zac Williams and Reese Simpson

Contact: zacw@uark.edu

Commented [JP1]: Zac – can you provide Reese's affiliation/degrees? Thank you!

Reliable backup power is essential for modern agricultural operations, particularly in livestock and poultry production, where environmental control systems must operate continuously. Power outages, even brief ones, can lead to ventilation failure, loss of temperature control, disruption of feeding and watering systems, and, ultimately, animal mortality.

For this reason, standby generators are a critical component of farm risk management. However, a generator is only as dependable as its maintenance program. Regular inspection, testing, and servicing are necessary to ensure that backup power systems function when needed most.

Farm operations commonly use several types of generators, including permanently installed standby units, portable generators, and tractor-powered (PTO) systems. Poultry and swine facilities often prefer sStandby generators because they automatically engage during a power outage through an automatic transfer switch (ATS). Most agricultural generators run on diesel, propane, or gasoline engines, each with specific maintenance requirements.

Regardless of type, all generators share key components: an engine, alternator, fuel system, cooling system, lubrication system, battery, and electrical controls. Proper maintenance of each component is essential for reliable operation.

Maintenance schedule

A routine maintenance schedule is the foundation of generator reliability. Producers should conduct visual inspections at least weekly, checking for fuel or oil leaks, loose connections and physical damage. Fuel and oil levels should be verified, and the battery should be inspected for corrosion or weak connections. Cleanliness is also important; debris buildup around the generator can restrict airflow and contribute to overheating.

Monthly maintenance should include operating the generator under load for 15 to 30 minutes. Running the unit under load helps ensure that the engine and alternator are functioning properly and prevents issues such as fuel system deposits or moisture accumulation. During these tests, operators should check coolant levels, inspect belts and hoses, and confirm that the automatic transfer switch engages correctly.

Load testing is one of the most important steps in verifying generator readiness. Starting the generator without applying a load does not adequately test its performance. Periodic load testing,

either through normal operation during outages or simulated conditions, ensures the generator can meet the facility's electrical demands. Load bank testing, conducted annually or as recommended, can identify performance issues before they lead to failure in a real emergency. Failure to regularly test a generator under load is a common cause of malfunction during emergencies.

Quarterly and annual maintenance tasks are more involved and may require professional service. Oil and oil filters should be changed according to manufacturer recommendations or hours of operation. Air filters should be inspected and replaced as needed to ensure proper airflow to the engine. Fuel systems should be routinely inspected for contamination, particularly water and microbial growth in stored fuel, as these contaminants can adversely affect engine performance and potentially cause fuel-system or engine damage.

Fuel management
Fuel management is a critical but often overlooked aspect of generator maintenance. Diesel fuel, in particular, can degrade over time and is susceptible to water contamination and microbial growth. To minimize these risks, fuel tanks should be kept as full as possible to reduce condensation, and fuel should be rotated or treated with stabilizers during long-term storage. Regular inspection and cleaning of fuel tanks can prevent clogging and ensure consistent engine performance.

Systems maintenance
The battery and electrical system are also common failure points. A generator that cannot start is often the result of a weak or dead battery. Batteries should be tested regularly, terminals should be cleaned to prevent corrosion and connections should be tightened. Most manufacturers recommend replacing generator batteries every two to three years, even if no problems are evident. Electrical wiring and connections should also be inspected periodically to ensure system integrity.

Cooling and lubrication systems must be maintained to prevent overheating and excessive engine wear. Engine oil should be checked frequently and changed according to recommended intervals. Coolant levels and condition should also be monitored, and any leaks or blockages addressed promptly. Proper airflow around the generator is necessary for cooling, making it important to keep the unit free of dust, feathers~~,~~ or other farm debris.

Record keeping, safety
Maintaining detailed generator maintenance records is an important best management practice. Logs should include inspection dates, service performed, oil and filter changes~~,~~ and any repairs. These records help ensure maintenance schedules are followed, assist in troubleshooting recurring issues~~,~~ and may be required for warranty or insurance purposes.

Safety should always be a priority when operating and maintaining generators. Generators produce carbon monoxide, a colorless and odorless gas that can be fatal in enclosed spaces. Units should always be operated in well-ventilated areas, and exhaust systems should be properly maintained. Fuel should be stored and handled according to safety guidelines, and lockout/tagout procedures should be followed during maintenance to prevent accidental startup.

Conclusion
A well-maintained generator is essential for protecting livestock, equipment~~,~~ and farm income during power outages. Preventive maintenance—including regular inspections, routine testing, proper fuel management~~,~~ and periodic professional servicing—ensures that backup power systems are ready when needed. By implementing a structured maintenance program, producers can reduce the risk of generator failure and improve their operations' overall resilience.