



IN THIS MODULE

- 4.1 Water Quality
- 4.2 Medicated Water
- 4.3 Feed Quality and Storage
- 4.4 On-Farm Feed Mill
- 4.5 Feed Distribution

Section 4.1

Water Quality

REFERENCED IN THIS SECTION:

Number/ Identifier	Name	Importance
-	Water Quality Test Result	Mandatory
	RECORDS	
R-2	Incident Report	
R-4	Monitoring Record	Mandatory
	FACT SHEET	
F-3	Water Sample Collection	-

SECTION 4.1

WATER QUALITY

REQUIREMENTS

1. Non-municipal water used in barns must be tested every 12 months for either:
 - a. nitrate levels, which must not exceed 300 mg/LOR
 - b. total coliform, which must not exceed 10 colony-forming units (CFU) per 100 mL.If either the nitrate or total coliform levels exceed the limits above, an action plan must be established to minimize the risk.
2. The water test report must include the following:
 - a. farm name, PID number, or legal land description
 - b. test results
 - c. date/year.
3. Water disinfectants or additives used to treat water must be approved for use in food animals.

RATIONALE

- a. Water quality is crucial for food safety and for the health and welfare of pigs.
- b. Water may contain a variety of microorganisms, including bacteria and viruses.
- c. Among bacterial contaminants, *Salmonella*, *Leptospira*, and *Escherichia coli* are the most commonly encountered.
- d. Total coliforms in the water may indicate an elevated risk of salmonella infection in the herd.
- e. Due to potential nitrate toxicity, water with a nitrate level above 300 mg/L may reduce average daily weight gain in growing pigs.
- f. Testing can help determine if there is a problem. Testing also confirms the water is safe for the pigs to drink.

GUIDANCE

1. **General**
 - a. The presence of nitrates in water can indicate bacterial contamination. If the nitrate levels in your water are elevated, you should send a water sample for bacterial testing.
 - b. The water-quality test sample should be taken at the water's closest access point into the barn, or at an access point immediately after it has passed through the in-barn water treatment system, if applicable.
 - c. It is also recommended that you test your water quality at the pigs' drinking source to evaluate the cleanliness of the water lines.
 - d. Contamination of incoming water by feces or agricultural chemicals should be actively prevented.
 - e. A farm's drainage system should prevent its waste water from contaminating incoming water.
 - f. It is recommended that a water treatment system (chlorination or other) be used for any surface water supplied to pigs.
 - g. It is recommended that water lines be cleaned regularly, especially prior to administering water-soluble vaccines. Cleaning the water lines will also control the development of biofilm and accumulation of minerals.
 - h. For additional information on water sampling, see the Water Sample Collection Fact Sheet F-3.

2. Microbiologic hazards

- a. Total coliform: These microorganisms are present in vegetation, animal feces, sewers and soil. A bacterial count is used as an indicator of the microbiological contamination of water.
- b. Fecal coliform: A subgroup of total coliforms, fecal coliforms are found in the intestines of warm-blooded animals. The most common type is *E. coli*, which is considered the best indicator of fecal contamination.
 - i. Fecal coliforms increase the risk of waterborne gastroenteritis (inflammation of the intestines).
 - ii. A fecal coliform count of 1 CFU/100 mL or higher can cause diarrhea in young pigs.
 - iii. It is recommended that the level of fecal coliforms be kept at <1 CFU/100 mL.
 - iv. It is recommended that producers use a recognized laboratory to complete fecal coliform and *E. coli* tests.
 - v. If your test results come back positive, a re-test is recommended to confirm the result.
- c. Water chlorination treatment will reduce coliform counts effectively.

3. Chemical hazards

- a. The level of total dissolved solids (TDS) is a general indicator of water quality and water hardness.
 - i. Water with a TDS of less than 1,000 mg/L is ideal for all ages of pigs.
 - ii. Water with a TDS of less than 3,000 mg/L is considered satisfactory.
 - iii. Water with a TDS level exceeding 7,000 mg/L can lead to water refusal and serious health problems (e.g., diarrhea, dehydration).
 - iv. Water with a TDS level of over 10,000 mg/L is unfit for animal consumption.
 - v. TDS is also an indication of water hardness. Hard water can result in precipitation or inactivation of drugs delivered through the water medicator. It can also reduce the effectiveness of cleaning and disinfection products.

4. PH levels

- a. A low pH results in:
 - i. reduction of pathogen survival
 - ii. the activation of digestive enzyme proteins (pepsinogen to pepsin).
- b. The benefits of the acidification of water in pig production:
 - i. improves digestion
 - ii. supports diversity and microbial balance
 - iii. supports intestinal health and integrity.

5. In the event of contamination:

- a. If your test results come back positive, a second test should be done to confirm the result.
- b. Consult an expert to assist you in determining the source of contamination.
- c. Eliminate the root cause of the problem.
- d. Conduct water-quality testing to confirm the effectiveness of the corrective actions, as required.
- e. Implement an action plan to prevent water contamination in the future.

AUDIT QUESTIONS

Q#	Audit Questions and Interpretations	Verification			
		Compliant	NC-Minor	NC-Major	N/A
	<p>If the barn is supplied by municipal water, answer "Compliant", and go to question 4.1.3.</p> <p>If the barn is not supplied by municipal water, answer "N/A", and complete questions 4.1.1. to 4.1.3.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q4.1.1	<p>Verify if a water test was performed in the last 12 months and that the water test report includes all required elements:</p> <ol style="list-style-type: none"> farm name, premises identification (PID) number, or legal land description test results date (month, day and year). <p>The primary water source must be tested.</p>	<p>Full and Partial Validation:</p> <p>➤ lab results</p>			
	<p>If the barn is not supplied by municipal water, was a water test performed in the last 12 months and were all required elements included?</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q4.1.2	<p>Verify whether a water test was performed for one of the two following options and with the following results:</p> <ol style="list-style-type: none"> Nitrate level – Verify that the level is at or below 300 mg/L (300 ppm). If the test result exceeds that limit, verify whether a written action plan has been established. The action plan should (at least) include: <ol style="list-style-type: none"> determining the source of the contamination using the appropriate water treatment (e.g., chlorination) testing again for nitrate level, or fecal coliform test performing a total coliform test. <p>OR</p> <ol style="list-style-type: none"> Total Coliform level – Verify that the level is at or below 10 CFU/100 mL. If the test result exceeds that limit, verify that a written action plan has been established. The action plan should (at least) include <ol style="list-style-type: none"> determining the source of the contamination using the appropriate water treatment (e.g., chlorination) and testing the total coliform level again. <p>If an action plan must be developed, consult with the herd veterinarian or water treatment specialist.</p>	<p>Full and Partial Validation:</p> <p>➤ lab results</p> <p>➤ corrective actions or measures are in place, if applicable</p>			
	<ol style="list-style-type: none"> Is the water test result for nitrate levels at or below 300 mg/L (300 ppm) or, if the test result exceeds this limit, has an action plan been established? Is the water test result for total coliform at or below 10 CFU/100 mL or, if the test result exceeds this limit, has an action plan been established? 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q#	Audit Questions and Interpretations	Verification			
		Compliant	NC-Minor	NC-Major	N/A
Q4.1.3	Verify that the products used to treat the water, such as disinfectants or additives have been approved for use in food animals. Check material safety data sheets to confirm.	Full and Partial Validation: ➤ review of the material safety data sheet(s)			
	If water disinfectants or additives are used to treat the water, are they approved for use in food animals?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CFU = colony-forming units; N/A = not applicable; PPM = parts per million



LEVELS OF COMPLIANCE – EXAMPLES

COMPLIANT

- The site is supplied by municipal water.
- A water test was completed within the last 12 months.
- The water test result met all PigSAFE-required elements.
- The water test result shows:
 - » a nitrate level exceeding 300 mg/L OR
 - » a total coliform count of at or above 10 CFU/100 mL BUT an appropriate corrective action plan was established.

MINOR NON-COMPLIANCE **Timeline: 12 months**

- The water test result shows a nitrate level exceeding 300 mg/L OR a total coliform count above 10 CFU/100 mL but no corrective actions were taken.

MAJOR NON-COMPLIANCE **Timeline: 60 days**

- The site is not supplied by municipal water and no water tests were performed in the last 12 months.
- The disinfectant(s) or additive(s) used to treat the water are not approved for use in food animals.



DEVIATION MEASURES

- If your test result exceeds the acceptable level, the designated personnel must develop an action plan, as described in the interpretation of question 4.1.2 a-b, with the herd veterinarian or water treatment specialist. Lab results must be kept on file.
- If water disinfectants or additives that are not approved are observed being used on-farm, the designated personnel must stop using the product and dispose of it according to the manufacturer.

Complete record R-2 Incident Report and R-4 Monitoring Record.

