

Animal Waste Management Plan

December 2004

Jennley Farm

Operated by:

Tom Stoller
Jennley Farm
18000 SE Webfoot Road
Dayton, Oregon 97114
(503) 868-7849

Review by 2/15/2005
MA # 174948

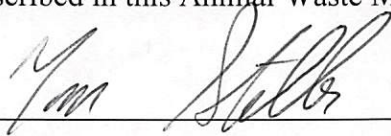
Approved 1/10/2005

Operation:

Broiler Chicken Facility
Large Federal CAFO

As owner and operator of **Jennley Farm**, I intend to manage in accordance with the practices described in this Animal Waste Management Plan.

Signature



Date

01/04/05

Tom Stoller - Jennley Farms

ANIMAL INVENTORY

Type of Animal	Number of Animals	Average Weight (lbs.)	Animal Units (1,000 lb.)	Nutrient Production						Manure CF/D/AU	Annual	
				(lbs./day/1000 lb. Animal Unit)			(lbs./day)				Days Confined	Days Grazed
				N	P	K	N	P	K			
CHICKEN (BROILER)	160,000	3	400.0	1.10	0.34	0.46	440.00	136.00	184.00	1.26	280	85

BEDDING VOLUME

Type of Animal	Type of Bedding Facility	Bedding Material	Unit Weight Lbs/CF	Amount Needed Lbs/Day/AU	Volume CF/Day/AU	Total Volume CF/Day	Total Weight Lbs/Day
CHICKEN(BROILER)	Loose Housing	Sawdust	12.00	12.00	0.40	160	4,800

SOLIDS SEPARATION FACTOR

Type of Animal	Type of Separator	Separation Factor %	Volume of Solids Separated CF/Day	Volume of Solids in Liquids CF/Day	Volume of Manure in Liquids CF/Day	Volume of Manure in Solids CF/Day	Accumulated Sludge in Storage CF/Day	Density of Separated Solids Lbs/CF	Weight of Separated Solids Lbs/Day
CHICKEN (BROILER)	Dry Scrape	100%	664	0	0	504	0	36	23,904

MONTHLY VOLUMES

Month	Runoff in Cubic Feet				Facility Water Use Cubic Feet	Manure		Bedding		Solids Separated		Solids in Liquids		Total Solids	Total Liquids
	Roof Area Square Feet	Paved Slab Area Square Feet	Unpaved Lot Area Square Feet	Slage Pit Surface Area, SF		Solids Cubic Feet	Liquids Cubic Feet	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Cubic Feet
	0	0	0	0		0	0	0	0	0	0	0	0	0	0
October	0	0	0	0	0	15,624	0	3,968	119,040	16,467	592,819	0	0	16,467	0
November	0	0	0	0	0	15,120	0	3,840	115,200	15,936	573,696	0	0	15,936	0
December	0	0	0	0	0	15,624	0	3,968	119,040	16,467	592,819	0	0	16,467	0
January	0	0	0	0	0	15,624	0	3,968	119,040	16,467	592,819	0	0	16,467	0
February	0	0	0	0	0	14,112	0	3,584	107,520	14,874	535,450	0	0	14,874	0
March	0	0	0	0	0	15,624	0	3,968	119,040	16,467	592,819	0	0	16,467	0
April	0	0	0	0	0	15,120	0	3,840	115,200	15,936	573,696	0	0	15,936	0
May	0	0	0	0	0	15,624	0	3,968	3,968	16,467	592,819	0	0	16,467	0
June	0	0	0	0	0	15,120	0	3,360	100,800	13,944	501,984	0	0	13,944	0
July	0	0	0	0	0	15,624	0	2,976	89,280	12,350	444,614	0	0	12,350	0
August	0	0	0	0	0	15,624	0	3,472	104,160	14,409	518,717	0	0	14,409	0
September	0	0	0	0	0	15,120	0	3,840	115,200	15,936	573,696	0	0	15,936	0
Annual	0	0	0	0	0	183,960	0	44,752	1,227,488	185,721	6,685,949	0	0	185,721	0

The volumes shown above are for raw manure and bedding.

100% of the manure is hauled directly out of the barns, into trucks, and off the farm.

Volume is reduced significantly during the storage and composting process.

Monthly volumes will fluctuate depending on confinement dates.

Animal Waste Management Plan

RECEIVED

FOR: Jenaley Farms
18000 S.E. Webfoot
Dayton, OR 97114

SEP 30 2004
NATURAL RESOURCES
DIVISION

CONTACT PERSON: Tom Stoller
Ph: (503) 868-7849

OPERATION: Chicken fixers for Foster Farms

LITTER DISPOSAL POLICY: Appendix #1

DEAD BIRD POLICY: Appendix #2

MA# 174948
Plan# 04139
Review by: 11/14/04

Appendix #2

Dead Bird Policy

Dead birds will be hauled
to the landfill or composted on the
farm.

Appendix #1

Litter Disposal Policy

All litter will be disposed off of the farm. Litter will not be stored on the farm except for my garden. The amount will be approximately 10 yds.

AWMP requirements

Tennley Farms places approximately 160,000 chickens at a time. This is done approximately six and one half times per year.

Litter is hauled out of the buildings by a front loader, deposited on a truck and hauled off the farm.

Tennley Farms has a storage building 50' x 60'. It is a pole building with an asphalt floor. If I was to store litter in this building, the litter would be piled and composted.

If I was to apply the litter, I would put it in a manure spreader and haul it to the field.

Litter is not applied to land that Tennley Farms owns or operates. If it ever is applied to land owned or operated by Tennley Farms, soil tests will be taken and approval will be requested by the Dept of Agriculture.

Jenley Farms generates approximately 2,500 yds of litter per year. The buildings are totally cleaned once per year. ~~and~~ When not totally cleaned, the cake is skimmed off and new litter is added.

Jenley Farms does not have or collect any wash water or any leachate from silage.

Rain water is allowed to run into the ground.

Litter is not applied to any land owned or operated by Jenley Farms

Litter will be analyzed with a testing process. This will be done from a sample taken out of a building.

I will forward a copy of the test results as soon as I receive them.

1) Schedule and disposing of manure:

The buildings are skimmed between flocks and the manure is loaded on a truck and hauled away.

The buildings are totally cleaned once per year and the manure is loaded on a truck and hauled away.

2) Weight of birds: 5.25 lbs

3) Bedding add per flock: 135 cubic yards of litter is added to the buildings per flock except when the buildings are totally cleaned when ~~then~~ 800 cubic yards of litter is added. This comes to a total of 1,542 cubic yds of litter per year.

4) Wash down of buildings: The buildings have not been washed down in several years. If we do wash down the inside of a building, the water is contained inside the building. Approximately 400 gallon is used

5) Run off from building roofs: The water goes into the ground.

6) Total lbs of Nitrogen, Phosphorus, and Potassium exported:

The numbers are based on
800 Tons of litter exported per year.

Nitrogen: 53,112.8 lbs

Phosphorus: 32,003.2 lbs

Potassium: 35,029.6 lbs

**ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT**

**RECORD KEEPING AND REPORTING TO OREGON DEPARTMENT OF
AGRICULTURE**

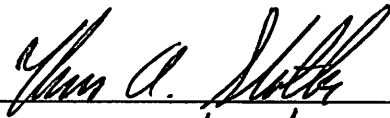
RECORD KEEPING:

- a) Applications of manure, litter and process waste will be kept, including the date and the amount of N and P applied during each application.
- b) Records of exporting manure, litter and process waste will also be kept.

REPORTING TO OREGON DEPARTMENT OF AGRICULTURE (ODA):

- a) Any discharge will be reported orally to ODA within 24 hours. Within 5 days, a written statement describing this discharge will also be submitted to ODA.
- b) The amount of manure, litter and process waste applied will be reported annually.
- c) The amount of manure, litter and process waste exported will be reported annually.

Signature of Legally Authorized Representative: _____



Print Name: _____

Thomas A. Steller

Date: _____

11/03/04

**ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT**

OPERATION AND MAINTANENCE

Jeanley Farms
Name of Operation

Mark all that apply to your operation.

☐

Above and/or Below Ground Liquid Tank

The tank serves as a collection point for effluent to drain to or be scraped from the animal feeding areas. If the tank will provide storage capacity to the waste management system it shall be completely emptied at the beginning of the storage period and the contents applied to cropland as weather and crop conditions permit. A 1-foot free board will be maintained to prevent spillage. Continually maintain all pumps, agitators, piping valves and all other electrical and mechanical equipment in good operating condition by following manufacturer's recommendations. Float valves will be maintained in good working order. Perform daily inspections of waterlines including drinking water or cooling water lines. Repair leaking lines immediately to prevent excess water from entering the waste storage system. Depth markers are installed to assure maximum volume will be maintained and checked weekly. At least once every 5 years, the tank shall be emptied and inspected for structural damage and leakage. Any damage found shall be corrected before putting the tank back in service. Remove all foreign debris within the structure that may cause damage to pumps and agitator. If below ground, the tank lid will not be subjected to more than two, 8,000 pound wheel loads. Before entering a tank, for any reason whatever, proper ventilation shall be provided, and self-contained breathing apparatus shall be used, if required, when entering a covered tank. No one shall enter the tank unless safety ropes are used and someone else capable of providing assistance is outside of the tank. Warning: Entering Unventilated Tanks Is Extremely Dangerous.

☐

Animal Access Lanes or Walkways

Damaged components will be repaired or replaced as needed. Debris and excess manure will be removed from roadway surfaces, road ditch and drainage areas. Maintain drainage area capacities. Maintain good vegetative cover on all slopes and watercourses.

☐

Agitator

Preventative maintenance will be in accordance with the manufacturer's recommendations. Periodically examine the agitator for proper operation. Clean debris from the propeller and promptly replace any defective or damaged parts. Remove the agitator from the manure tank or pond and periodically clean and oil as needed to increase the life expectancy of the agitator. Immediately repair any vandalism or livestock damage. Do not allow livestock near the equipment during operation.



Concrete Gutters

Floor gutters and grates will be inspected periodically. All foreign material restricting flow will be removed. Damage will be repaired as needed.



Curbs

Curbs, gutters and slabs that are used to convey effluent will be inspected periodically. Broken sections will be repaired or replaced. Manure or other solids will be prevented from building up next to curbs or flowing over them. If over flow is a consistent problem the curb height should be increased.



Culverts

Inspect annually or after large rainfall event. All foreign objects restricting water flow will be removed. Damaged sections will be repaired or replaced. Erosion around inlet or outlet will be corrected.



Dry Stack Storage Facility

Solid manure storage facility will be inspected annually. Broken slabs and curbs will be repaired. Repair or replace rusted or damaged areas on roof structure. Broken gutters and/or downspouts will be repaired or replaced. Check for adequacy and function of drain away from downspouts. Check side and back walls for soundness. Manure solids and leachate will not escape through cracks in the facility.



Fencing

Fences will be inspected periodically. Broken or decayed posts will be replaced. Sagging wire will be tightened. Broken wire will be spliced or replaced. Broken or missing insulators for electric fencing will be replaced. Vegetation will be controlled under the fences. Electric fencing will be sufficiently charged to detour animals.



Filter Strips

Maintain vigorous growth of vegetative covering. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing, harvesting or grazing may also be needed to control height. Remove all foreign debris that hinders system operation. Limit the traffic from filter strip area. Limit livestock usage to vegetative growth periods when the animals will not damage vegetative root system or compact the soil. Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage.



Gutters and Downspouts

Gutters will be inspected annually to ensure all gutters are free of foreign materials. Broken gutters or downspouts will be replaced or repaired. Gutters will be connected to downspouts. Leaky gutters and downspouts will be repaired. Weeds and sediment will be removed from downspout outlets. All downspouts will be connected to outlets, which are kept free flowing. Outlets will be inspected for rodent guards and repaired or replaced as needed.



Irrigation Water Management

Irrigation water application will be at rates that minimize transport of sediment, nutrients, and chemicals to surface water and ground water. Equipment modifications and/or soil amendments such as polyacrylamides and mulches should be considered to reduce erosion if needed.



Manure Application Equipment

All manure application equipment (including but not limited to sprinklers, big gun irrigators, spreaders and/or tank wagons) will be operated and maintained according to the manufacturer's manual. Equipment found to be broken or worn will be replaced. Equipment will be calibrated to ensure recommended rates are applied. Liquids will be drained from sprinklers or big guns prior to freezing weather. When system is flushed, rinse water is used following waste, and liquid and sediment is applied agronomically. Nozzles will be checked periodically and if worn, nozzles will be replaced. Minimize exposure to animal and organic waters and manure gasses. Wear protective clothing when appropriate. When cleaning equipment after nutrient application, remove and save wastes in an appropriate manner. Avoid applying manure near surface water by establishing buffer strips and set backs, and use extreme care to avoid contaminating ground water.



Manure Effluent and Irrigation Transfer Lines.

Manure, effluent and irrigation lines shall be flushed with clean water periodically to prevent particle buildup and plugging. Manure flushed from the lines will be applied agronomically so that surface and groundwater will be protected. Manure, effluent and irrigation lines shall be inspected periodically for leaks or worn out nozzles, and repairs or replacements made as needed. Special inspection shall be done to pressure relief valves, risers and control valves. Shut off valves will be inspected annually. Avoid unnecessary travel over pipelines that will damage their integrity. Equipment found to be broken or worn will be replaced. Water will be drained during cold weather to prevent frozen or broken lines. These lines can explode if not properly maintained and may cause human injury.



Pumps

Pumps will be maintained in accordance with manufacturer's operation and maintenance manual. Effluent will be drained from pumps prior to freezing weather. Pumps will be inspected periodically to identify and remove debris wrapped around impeller or worn parts. Appropriate action will be taken to repair any worn parts. Liquids will be drained from pump prior to freezing weather to prevent breakage. It is recommended to have a spare pump or back up system in case a pump must be removed for an extended time for repair.



Roofs

Roofs will be inspected annually. Rusted sections will be replaced or repaired if needed. Loose sections will be secured. All broken trusses, beams, poles, gutters and downspouts will be repaired or replaced.



Solid Manure Separator

The separator should be inspected regularly for deterioration of protective coatings and repaired as necessary. All plumbing will be inspected annually and broken lines will be replaced or repaired. Loose connections will be tightened. If applicable, electric motors, pumps and gears should be routinely maintained. Separator will be operated and maintained according to manufacturer's manual.



Subsurface Drainage System

Subsurface drainage will be inspected annually. Fields will be checked for breaks or suck holes. Outlets will be kept free of vegetation and sediment. Erosion at outlets will be corrected with riprap or other means. Damage or broken lines will be repaired. Outlets from fields on which animal waste is being applied will be monitored daily. Animal waste applications will cease if the tile outflow contains any indication of animal waste.



Trough or Tank

Watering facility will be inspected periodically. Damaged tank/trough will be repaired or replaced. Float valves will be maintained in good working order. Area immediately surrounding the trough/tank will be maintained in a stable condition. Watering facility will be inspected periodically. Damaged tank/trough will be repaired or replaced. Float valves will be maintained in good working order. Area immediately surrounding the trough/tank will be maintained in a stable condition. Watering facilities will not be allowed to overflow if additional liquid will affect waste storage capacities.



Waste Storage Pond

Prior to the storage season, empty the pond to provide storage capacity for the accumulation of wastewater and precipitation during the winter storage period. Sludge and accumulated solids will be removed from the pond periodically when buildup limits storage capacity in the pond. Depth markers are installed to assure maximum volume will be maintained and checked weekly. A 2-foot free board will be maintained to prevent spillage.

Maintain all pumps, agitators, pipeline, valves, and electrical and mechanical equipment in good operating condition following the manufacturer's recommendations. Immediately repair any vandalism, vehicular, or livestock damage to any earth fill. Immediately remove any obstructions or blockage of spillways, trash racks or pipe inlets. Settlement or cracks in earthen sections should be investigated to determine cause and immediately repaired. Maintain vigorous growth of vegetative coverings on the dikes to eliminate soil erosion. Eradicate or otherwise remove all rodents or burrowing animals and repair any damage caused by their activity. Fences and/or warning signs should be maintained as necessary to unauthorized human or livestock entry. Operate systems in a manner that minimizes odor and drift.



Signature of Legally Authorized Representative: _____

Print Name: _____

Date: _____

Thomas A. Staller

Thomas A. Staller 11/03/04

**ANIMAL WASTE MANAGEMENT PLAN
MINIMUM REQUIRED ELEMENT**

ADDITIONAL REQUIREMENTS FOR LARGE FEDERAL CAFOs

Tenley Farms

NAME OF OPERATION

<u>A) INSPECTIONS:</u>	FREQUENCY OF INSPECTIONS	ITEM(S) TO BE INSPECTED
	DAILY	• Water lines
	WEEKLY	• Storm water diversions • Run-off diversions • Waste transport • Storage structures • Storage structure volume
	PERIODIC	• Application equipment leaks

B) RECORD KEEPING:

Record results of:

- 1) Daily inspections.
- 2) Weekly inspections.
- 3) Periodic inspections.
- 4) Corrective actions taken, explain those not corrected.
- 5) Expected crop yields (if not in the plan).
- 6) Weather conditions at the time of manure, litter or process water application and 24 hours before and after application.
- 7) Total amount of manure or wastewater transferred to other persons, including date and amount of each transfer and the name and address of each recipient.

C) OPERATION REQUIREMENTS:

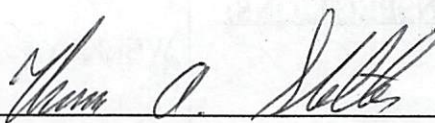
- 1) Must have depth markers in all surface liquid impoundments (i.e. lagoons, ponds, tanks). Markers must indicate:
 - a. Maximum design volume.
 - b. Minimum capacity necessary to contain 25-year, 24 hours rainfall event.
 - c. Depth of manure and process wastewater.
- 2) Maintain setback area within 100 feet of any down gradient surface water, open tile line intake structure, sinkholes, agricultural wellheads, or other conduits to surface waters where manure, litter, and other process wastewaters are prohibited. As a compliance alternative, and if demonstrated to the satisfaction of ODA, the permittee may:

- a. Establish a 35 ft vegetated buffer where manure, litter and other process waste waters are prohibited: or
- b. Demonstrate that a setback or vegetated buffer is not necessary or may be reduced.

D) MONITORING:

- 1) Collect and analyze manure, litter and other process wastewaters annually for nutrient content, including nitrogen and phosphorus.
- 2) At least once, during the term of the permit, collect and analyze representative soil samples for phosphorus and nitrogen content from all fields where manure, litter and other process waste waters are applied

Signature of Legally Authorized Representative: _____



Print Name: _____

Thomas A. Stoller

Date: _____

12/04/04



Map of: T-523

NHEL = Not Erodible; HEL = Erodible; Blue Dot = Hydric Soils

Map Not To Scale

Yamhill County

March 25, 2004

Fact Sheet

NO. 12 JANUARY 1999

Fertilizing for Profit

Tips for Small Acreages in Oregon



*"Watch earnestly
over every acre."*

- Clarence Poe

USDA Agricultural Research Service

Make the Most of Your Fertilizer

In 1900, each American farmer produced enough food and fiber for 10 people. Today, with advances such as synthetic fertilizers, that number is 129 people. This abundance of food and fiber brings with it the responsibility to keep fertilizers on the land and out of the water. **Nutrient management** is a practice that applies fertilizers efficiently without polluting water. The benefits are:

High crop yields with lower fertilizer costs.

In one study, Oregon dairy farmers applied manure as a fertilizer. They saved \$30 to \$70 in commercial fertilizer costs per acre without decreasing yield.

Healthy animals.

Horses, cattle, sheep, and goats can get nitrate poisoning from forage grown on overfertilized soils. Taking a soil test and applying the right rates of fertilizer and manure can reduce this health problem.

Clean water for healthy people and fish.

When fertilizers reach surface water and groundwater, nitrate in well water may harm infants. Excess phosphorous may cause algae blooms, reduce oxygen, and kill fish. Applying fertilizers correctly has reduced nitrate in groundwater in Ontario, Oregon.

Fertilize at the Right Rate: Soil Tests

A soil test is the simplest way to manage fertilizers for a healthy crop and environment. A soil test will tell you the level of nutrients in your soil and how much fertilizer to apply to the crop. Follow these steps to take a soil test:



1. Draw a map of your farm.

Assign a name or code for each area to be soil tested. Use this map to record fertilizer applied, crops grown, and yields. This will help you to identify your soil samples and to record the results of your nutrient management program.

2. Use the right equipment.

Take soil samples with a soil probe, garden spade, or shovel. Collect the samples in a clean plastic pail or paper bag. Soil sampling tools should be chrome-plated or stainless steel when testing for micronutrients.

3. Establish sampling areas.

Identify areas that have different soils, crops, or manure histories and test these separately. Avoid taking samples from unusual areas like fence rows, manured areas, and old building sites. Stay at least 150 feet from gravel roads.

4. Sample in the spring or fall.

Send in soil samples at least 3 to 6 weeks before planting. This should give labs enough time to test soils and send you the results in time for planting. Consider sending samples in the fall when labs are less busy. Test at the same time of year to compare results from year to year. Follow lab fertilizer and lime recommendations or use OSU Fertilizer Guides.

5. Take 15 to 20 subsamples per area.

The area should be less than 20 acres. Scrape plant litter from the soil surface and sample the top 8 inches of soil (depths for special situations are in the table on page 2). If using a shovel, dig an 8-inch-deep hole and slice a 1-inch-thick slab from the side. Trim soil away on each side, leaving a 1-inch-thick strip for the subsample.

6. Mix subsamples together in pail and dry in a clean area.

Do not use an oven or the hot sun to dry soils.

7. Send at least 1 cup of soil for each sample to a lab.

Ask the lab about costs and mailing instructions. Include information on past cropping history, crop to be grown, and yield goal. Label soil samples and key them to your map. For a list of labs, see the Oregon State University (OSU) Extension Service publication *A List of Analytical Laboratories Serving Oregon* (EM8677). To get this publication, see the website listed in the "For Help" section at the end of this fact sheet or visit your local Extension Service office.

Location	Building Site	Garden	Permanent Pasture	Lawn	Cropland	No-till Crop
How Often to Take Soil Test	Once, after topsoil is replaced	1 to 3 years	2 to 3 years	3 to 5 years	1 to 3 years	1 to 3 years
How Deep to Sample Soil	0 to 8 inches	0 to 8 inches	0 to 3 inches	0 to 8 inches	0 to 8 inches	0 to 4 inches pH, P, K



Fertilizer Labels: Cracking the Code

Plants need many nutrients to grow and reproduce. Plants most often lack **nitrogen, phosphorus, potassium, and sulfur**. In the late winter and early spring, plants may be yellow or purple due to temporary deficiencies in wet or cold soils. Wait until plants are actively growing before fertilizing. Here are some signs of nutrient deficiencies in plants:

- **Nitrogen (N)** - Older leaves have a light green to a pale yellow color that proceeds to the younger leaves.
- **Phosphorus (P)** - Leaves have a dull blue-green color and stems may be purple.
- **Potassium (K)** - Older leaves have scorched brown tips or a yellow color that proceeds to younger leaves.
- **Sulfur (S)** - Older leaves are green while younger leaves are light green or yellow.

Fertilizers add to nutrients already in the soil. All fertilizer bags are labeled with a series of numbers that show the percentage of nutrients in a bag. A label of 27-13-7 means there's 27 percent **nitrogen**, 13 percent **phosphate**, and 7 percent **potash** by weight in the bag. A 100-pound (lb.) bag of 27-13-7 spread over 1 acre would spread 27 pounds of nitrogen, 13 pounds of phosphate, and 7 pounds of potash per acre.

Organic fertilizers are unprocessed and unrefined fertilizers like blood meal, rock phosphate, and manure. When organic fertilizers are purchased in bags, they are labeled in the same manner as synthetic fertilizers. In general, an organic fertilizer releases nutrients over a longer time than a synthetic one. This can be an advantage as nutrients are supplied to a plant throughout its growth. A drawback is that the organic fertilizer may not release enough nutrients at a critical growth point.

Soil pH: the Acid Test

Soil pH is a measure of soil acidity and affects the availability of nutrients. A soil with a pH below 7.0 is acidic, while one with a pH above 7.0 is alkaline. A very acidic soil will release aluminum and manganese and become toxic to plants. A very alkaline soil will make phosphorus and iron unavailable to plants. Ideal pH ranges are:

- Pure grass stands 5.5 - 6.0
- Legume-grass mixes 6.0 - 6.5
- Row crops, small grains 6.0 - 6.5
- Alfalfa 6.5 - 7.5

Western Oregon soils are generally acidic and **eastern Oregon** soils are often alkaline. If the soil is too acidic for your crop, add lime to raise the pH. OSU Fertilizer Guides will help you to determine how much lime is needed based on the soil pH and buffer pH shown on your soil test results. If your soil test shows that magnesium is deficient, apply dolomite lime. If magnesium levels are acceptable, apply the less expensive "ag lime." Sometimes soil is too alkaline for a particular crop and sulfur is needed to lower pH. For more information, see the OSU Extension Service publication *Fertilizer and Lime Materials* (FG52).

Fertilizers in the Right Place, Right Time

To get the most bang for your fertilizer buck and avoid pollution, follow these strategies:

Use the right amount.

This is where "an ounce of prevention is worth a pound of cure." Avoid applying excess levels of nutrients to the soil. Otherwise, nitrate may leach and pollute groundwater, phosphorus runoff may cause algae blooms, and high nitrate levels in forages may poison horses, goats, sheep, and cattle. Fertilize based on a soil test and realistic crop yield goals. Calibrate fertilizer spreaders. If manure cannot be worked into the soil, avoid spreading manure more than one-half inch thick on the ground each year. This will reduce the potential for polluted runoff.

Put it in the right place and work it into the soil.

Most phosphorus is immobile in soil. This means plant roots must grow to the source of phosphorus. If phosphorus is needed, band the fertilizer 2 inches to the side and 2 inches below the seed to give seedlings a good start. Beware of banding fertilizers too close as banded nitrogen, potash, and boron may burn the seed. Manure that is broadcast should be worked into the soil within 3 days. Otherwise, up to a third of the available nitrogen in manure may be lost as gas. Know your field limitations. When nutrients cannot be worked into the soil, avoid spreading in areas where water flow may concentrate, in floodplains, or within 50 feet of streams.

Apply it at the right time.

Water can dissolve nitrogen and carry phosphorus attached to soil particles. This means rain, snow, or floods can move nitrate into groundwater and nitrogen and phosphorus over land and into lakes and streams. Apply fertilizer and manure during the growing season when crops will use the nutrients. Split the applications of nitrogen on pastures, lawns, and crops for maximum plant uptake and minimum loss to runoff. Avoid applying fertilizer or manure during fall rains, in the winter, or on saturated soils. This may require manure storage, depending on your situation. For more about manure storage, see the fact sheet *Managing Mud and Manure* in this series.

Follow the right conservation practices.

Phosphorus is held tightly to soil and is moved mostly by loss of soil due to erosion. Reduce phosphorus losses using erosion control practices such as conservation tillage, contour strip cropping, and grass waterways. Capture phosphorus and nitrogen with winter cover crops, grass filter strips at field borders, and streamside buffers. Manage irrigation water to reduce leaching and erosion losses and excessive runoff.

Take Credit for Legumes

Grow legumes to add nitrogen naturally to the soil. Legumes include alfalfa, clovers, beans, peas, and birdsfoot trefoil. Reduce your nitrogen application by 40 pounds when following clover and up to 100 pounds per acre after alfalfa. Even grass may add a flush of nitrogen to the soil.

Fertilizing Pastures

Pastures need less fertilizer than row crops because grazing animals return manure nutrients to the soil. Rotational grazing will distribute manure more evenly. Take a soil test to find out the nutrient levels and pH in your soil. For more information, see the OSU Extension Service publication *Pastures: Western Oregon and Western Washington* (FG63).



Ada Soil Conservation District



Make the Most of Manure

Manure is like an unmarked bag of fertilizer. Consider this: if you fed **10 acres of corn** to your livestock, your animals would excrete enough phosphorus and potassium to grow another **7 acres of corn**. Treat manure as you would treat a bag of fertilizer. Store it in a covered place and apply it when and where it won't get washed away. With a little patience, you can find the fertilizer value of manure on your farm:

1. Take a manure test. Manure is not uniform.

Take samples from many places in the manure pile or from each spreader load. Find a lab that tests manure. Fill a plastic container two-thirds full to accommodate liquid expansion, freeze or refrigerate before shipping to reduce nitrogen loss, and send to the lab at the beginning of the week so that samples are not held over the weekend. As a minimum, test for percent solids, total nitrogen (N), ammonium-nitrogen ($\text{NH}_4\text{-N}$), total phosphorus (P), and total potassium (K). Test at least once a year or more if there are significant changes in manure storage methods.

2. Use soil and manure test results to determine the amount of nutrients in soils and manure.

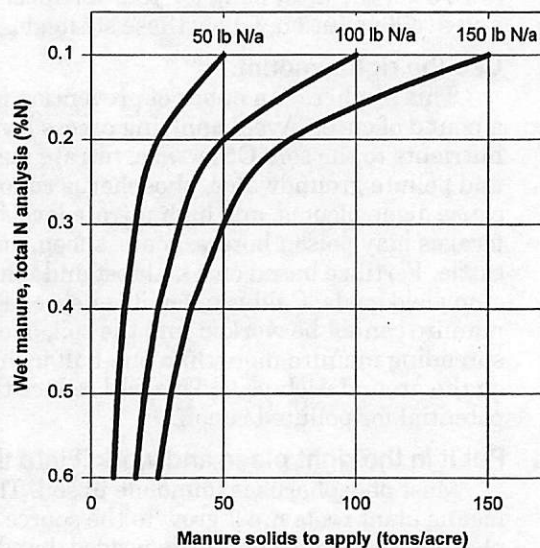
Use soil test results and OSU Fertilizer Guidelines to determine the nutrient needs for your particular crop. Manure test results are reported in "percent N, P, and K as received."

3. Calibrate your wheelbarrow or spreader.

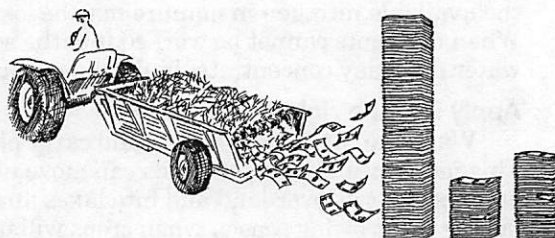
Estimate the number of cubic feet of manure that your wheelbarrow will hold. One cubic foot of manure weighs about 62 pounds. Divide the number of cubic feet by 2,000 pounds to determine the fraction of a ton that your wheelbarrow will hold. Use your answer, the soil test, and the manure test results to spread the correct number of tons needed per acre to spread manure as a fertilizer, according to the graph.

To find the number of tons of manure in a **spreader load**, use the sheet method, the stated capacity from the owner's manual, or portable truck scales. To use the sheet method, place a **10-foot by 10-foot plastic tarp** in the field and drive over it with the spreader. Weigh the manure and multiply the weight (in pounds) by 0.22 to determine tons applied per acre. Do this at least three times and take an average. Use your answer, the soil test, and the manure test results to spread the correct number of tons needed per acre to spread manure as a fertilizer, according to the graph. For more information, see the Oregon State University Extension Service publications *Manure Application Rates for Forage Production* (EM 8585) and *Dairy Manure as a Fertilizer Source* (EM 8586).

Manure solids



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- The soil and water conservation district and USDA Natural Resources Conservation Service may provide technical advice on soil testing, applying fertilizers, and spreading manure. Contact your local office by looking in the phone book blue pages under Federal Government.
- The Oregon State University (OSU) Extension Service provides technical advice through publications, workshops, and over-the-phone assistance. Publications may be found online at <http://osu.orst.edu/dept/infonet/soilfert.htm> or at your local Extension Service office.

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