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Annual Manure Application Schedule for Western Oregon

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The overall objective of manure management should be to take as many excretable manure nutrients to the soil and have them used by plants for optimal crop yield. This reduces the need to purchase feed and inorganic fertilizer. The usual outcome of manure management is finding as many acres as possible for manure application. Manure application scheduling depends on the type of manure.

Apply *liquid manure* on a schedule that provides nutrients in the soil root zone in anticipation of crop growth. Apply when soils are at field capacity or less moisture content, i.e., some air space exists in the topsoil. (See Figure 1.) There are several ways to measure soil moisture. You can squeeze a handful of soil and see whether it clumps together. If it does, it probably is at least at field capacity. If water runs out of your hands, then the soil probably is near or at complete soil saturation. You also can measure soil moisture with portable soil meters, tensiometers, watermarks, or other sensory devices.

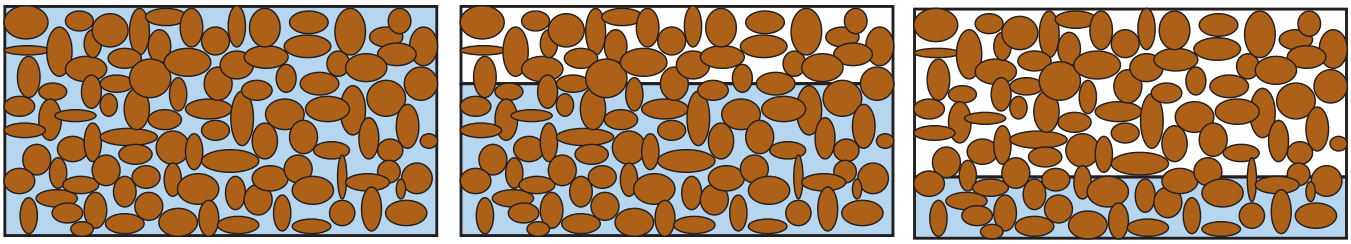
Apply *solid manure* in such a manner that it will not leave the field surface during rainfall events or flooding.

Spring and summer are the best times for manure application. Empty all storage facilities by October 1 of every year in preparation for the winter storage season.

Soil testing is an important part of manure application scheduling. A fall test is especially important as it serves as a report card to evaluate crop yield during the previous growing period in relationship to plant-available nutrients, especially nitrate-N. If excessive soil nutrients (N, P, K) are measured, plan a strategy for reducing these values by reducing manure application, changing crop variety, and/or increasing yield.

Soil tests also help you decide where to apply manure. They help show whether you are distributing manure on enough crop acres to result in optimal crop yield per acre. Placing too many manure nutrients on too few acres results in excess soil concentrations and reduced nutrients used for crop growth.

Figure 1.—*Topsoil profile:* ***blue*** *indicates soil moisture,* ***white*** *indicates air space (capacity for liquid to fill), and soil particles are* ***brown.***



Probable fall/winter soils
- 100% saturated
- Apply minimal solids.
- **Do not apply liquid.**

Probable spring/fall soils
- Typical field capacity
- Apply solids.
- **Apply minimal liquid/ application.**

Probable summer soils
- Typical wilting coefficient
- Apply solids.
- **Apply liquid.**

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Agronomic considerations

Nitrogen (N)

Take a fall soil sample from manured fields. Any concentration of 100 lb (27 ppm) nitrate-N or higher is excessive and indicates less agronomic uptake than the sum of organic mineralization, fertilizer input, and manure application. A goal for this report card test is 55 lb (15 ppm) soil nitrate-N in the top foot. Reduce manure application the following year and increase crop yield (or change the crop) in order to reduce fall nitrate-N.

A spring nitrate-N analysis generally is not required because winter rainfall, high water tables, and denitrification leach nitrate-N out of the soil. A cover/relay/double crop or permanent grass will scavenge some of this leftover nitrate-N.

A spring application of manure-N is highly recommended due to the winter losses. This application is especially important for annual and perennial grass. In corn fields, the pre-sidedress soil nitrate test (PSNT) will indicate whether further manure is required.

Manure excretion N is half organic and half ammonium. There is no nitrate in manure.

Phosphorus (P)

You can take a soil test for P at any time. The soil test for P shows extractable P, or plant-available P. It indicates the amount of P in the soil that can be used for plant growth at a given time. Heavily manured fields usually have higher levels of soil test P than do nonmanured fields.

Any concentration of 100 ppm or higher of soil test P is excessive. Do not add P to these fields. However, storage pond supernatent contains very little manure P; applications can be made based on N or K requirement.

If soil test P is excessive, reduce manure application the following year so P can be mined out of the soil by plants. However, fields with high levels of organic matter can buffer P so that soil test P does not drop rapidly. Mining will occur slowly in these fields.

Excessive P in the soil in any form can have a negative impact on water quality if soil erosion moves topsoil into surface waters, carrying with it all forms of soil P. Excessive P in surface water increases aquatic plant growth and reduces the amount of oxygen in the water available for fish.

Potassium (K)

You can take a soil test for K at any time. The soil test for K indicates plant-available K. Heavily manured fields usually have a higher level of K, especially fields receiving liquid manure.

Any concentration of 800 ppm or higher of plant-available K is excessive. Problems with excessive K in the soil can cause high plant K concentrations that can have a negative impact on herd health, especially in fresh and early lactating cows. Excessive K, if leached into groundwater, can increase the salt concentration of water. Also, like sodium, excessive K can reduce water infiltration through soil by hanging onto water.

Therefore, managing K on the basis of ration makeup is a good strategy. If feeds low in K are needed for a particular ration, you may need to avoid applying liquid manure on one field until K is mined out.

For more information

See page 3 for ordering instructions.

Assessing the Risk of Groundwater Contamination from Livestock Manure Management Worksheet, EM 8596 (1995). $1.00

Calculating the Fertilizer Value of Manure from Livestock Operations, EC 1094 (revised 1991, reprinted 1993). $1.00

Date, Rate, and Place: The Field Book for Dairy Manure Applicators, PNW 506 (1998). $5.50

Manure Management in Small Farm Livestock Operations: Protecting Surface and Groundwater, EM 8649 (published 1996, reprinted 1997). $1.75

Manure Management Practices to Reduce Water Pollution, FS 281 (published 1982, reprinted 1993). No charge.

Nutrient Management for Dairy Production: Assessing Your Manure Management for Water Quality Risk, EM 8646 (1996). 75¢

Nutrient Management for Dairy Production: Dairy Manure as a Fertilizer Source, EM 8586 (published 1995, reprinted 1997). $1.00

Nutrient Management for Dairy Production: Manure Application Rates for Forage Production, EM 8585 (published 1996, reprinted 1997). $1.00

Nutrient Management for Dairy Production: The Pre-Sidedress Soil Nitrate Test (PSNT) for Western Oregon and Western Washington, EM 8650 (published 1996, reprinted 1997). 75¢

Nutrient Management for Dairy Production: Which Test Is Best? Customizing Dairy Manure Nutrient Testing, PNW 505 (1997). $2.00

Reducing the risk of Groundwater Contamination from Livestock Manure Management, EM 8597 (1995). $1.25

Ordering instructions

To order copies of the publications listed under "For more information," send the publication's complete title and series number, along with a check or money order for the amount listed (payable to Oregon State University), to:

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Summary

- Apply liquid manure on a schedule that provides nutrients in the soil root zone in anticipation of crop growth.
- Apply liquid manure when soils are at field capacity or less moisture content, i.e., some air space exists in the topsoil. A soil moisture sensor/meter or field hand-grab sample is useful.
- Apply solid manure in such a manner that it will not leave the field surface during rainfall events or flooding.
- Empty all storage facilities of any size by October 1 of every year.
- Use soil testing, especially the fall test, as a report card to evaluate crop yield during the previous growing period in relationship to plant-available nutrients, especially nitrate-N.
- If excessive soil nutrients (N, P, K) are measured, plan a strategy for reducing these values by reducing manure application, changing crop variety, and/or increasing yield.
- Soil tests will help you decide where to apply manure. They will help show whether you are distributing manure on enough crop acres to result in optimal crop yield per acre. Placing too many manure nutrients on too few acres results in excess soil concentrations and reduced nutrients used for crop growth.
- The overall objective of manure management should be to take as many excretable manure nutrients to the soil and have them used by plants for optimal crop yield. This reduces the need to purchase feed and inorganic fertilizer. The usual outcome of manure management is finding as many acres as possible for manure application.

Example Manure Application Calendar

Sample liquid manure application dates are indicated with **orange**. Solids application dates are underlined. Actual application dates will be determined by weather and soil conditions.

Winter

January

					1	2
3	**4**	5	6	7	8	9
10	11	12	**13**	14	15	16
17	18	**19**	20	21	22	23
24	25	26	**27**	28	29	30
31						

February

	1	2	**3**	4	5	**6**
7	8	**9**	10	11	**12**	13
14	**15**	16	17	**18**	19	20
21	22	23	**24**	25	**26**	27
28						

March

	1	**2**	**3**	**4**	5	6
7	**8**	**9**	10	11	**12**	**13**
14	15	**16**	17	18	19	20
21	**22**	**23**	24	25	26	**27**
28	**29**	**30**	31			

- Apply liquid when soil is at field capacity or less moisture content.
- Apply solids when application will not leave the surface during heavy rainfall.
- Do not apply liquid to bare fields.
- Do not apply liquid to fields with a high or perched water table.
- Do not apply liquid to fields with soggy soils or to flooded fields.
- Identify "go-to fields" every winter that are better drained and have crop biomass.

Likely application days

	Liquid	Solid
January	6	15
February	10	18
March	15	24

Spring

April

				1	**2**	3
4	**5**	**6**	**7**	**8**	**9**	10
11	12	**13**	**14**	**15**	16	17
18	**19**	**20**	**21**	22	23	24
25	**26**	**27**	**28**	**29**	**30**	

May

						1
2	**3**	**4**	**5**	**6**	**7**	8
9	**10**	**11**	**12**	**13**	**14**	**15**
16	**17**	**18**	**19**	**20**	**21**	22
23	**24**	**25**	**26**	**27**	**28**	**29**
30	31					

June

		1	**2**	**3**	**4**	**5**
6	7	8	**9**	**10**	**11**	12
13	**14**	**15**	**16**	**17**	**18**	**19**
20	**21**	**22**	**23**	**24**	**25**	**26**
27	28	**29**	**30**	31		

- Apply liquid when soil is at field capacity or less moisture content.
- Apply solids any time.
- Use this season for liquid pumping on all crop ground.
- Liquids can be applied to bare ground.
- Liquids can be applied to fields with high or perched water tables and to fields that have soggy soils but have drained.
- Use this season for emptying accumulated manure fines-solids in all ponds.
- This is the season for more frequent, but light-rate, applications.

Likely application days

	Liquid	Solid
April	20	30
May	24	30
June	24	27

Summer

July

				1	**2**	3
4	**5**	**6**	**7**	**8**	9	10
11	**12**	**13**	14	15	16	17
18	**19**	**20**	**21**	**22**	23	**24**
25	**26**	27	28	29	30	31

August

1	**2**	**3**	**4**	5	6	7
8	9	10	**11**	**12**	**13**	14
15	16	**17**	18	19	20	21
22	**23**	**24**	**25**	26	27	**28**
29	30	31				

September

			1	**2**	**3**	4
5	6	**7**	**8**	9	10	11
12	**13**	14	15	**16**	17	18
19	20	21	**22**	**23**	24	25
26	**27**	28	29	30		

- Apply liquid when soil is at field capacity or less moisture content.
- Apply solids any time.
- Use this season for liquid pumping on grass and corn (use PSNT).
- Liquids can be applied to postharvest fields of any kind, especially nonmanured fields of grains or grass seed.
- All storage facilities should be drawn down (pumped out) in preparation for the winter storage season.

Likely application days

	Liquid	Solid
July	15	27
August	12	20
September	10	15

Fall

October

					1	2
3	4	**5**	6	7	8	9
10	11	12	13	14	**15**	16
17	18	19	**20**	21	22	23
24	**25**	26	27	28	29	**30**
31						

November

	1	2	3	4	5	6
7	8	9	**10**	11	12	13
14	15	16	17	18	19	**20**
21	22	23	24	25	26	27
28	29	**30**				

December

		1	2	3	4	
5	6	7	8	9	**10**	11
12	13	14	15	16	17	18
19	**20**	21	22	23	24	25
26	27	28	29	**30**	31	

- Apply liquid when soil is at field capacity or less moisture content.
- Apply solids when application will not leave the surface during heavy rainfall.
- Do not apply liquid to bare fields.
- Do not apply liquids to fields with high or perched water tables.
- Do not apply liquids to fields with soggy soils or those that are likely to flood.
- Apply liquids to fields with plant biomass such as a double crop.
- Use this season primarily for liquid storage.

Likely application days

	Liquid	Solid
October	6	6
November	3	6
December	3	4