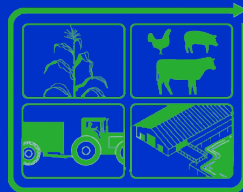
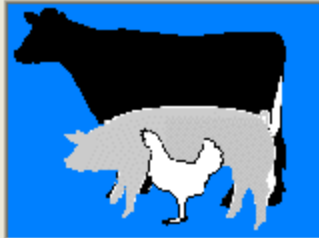


Animal Waste Management Software

CNMP Core Curriculum



Animal Waste Management Computer Program



AWM

Animal Waste Management

Version 2.4.0

Database Version 2.80

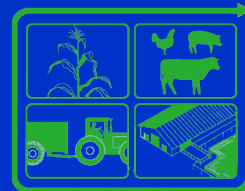
United States Department of Agriculture



Disclaimer

As with any engineering software, use of AWM, or any information on this software package, is not a replacement for a professional engineering evaluation of the situation. This software is meant for supporting you in evaluating and designing animal waste storage structures and is in no way a replacement for a thorough engineering review. A professional engineer, licensed in the appropriate field of engineering, should always conduct the final evaluation of the application; and that individual, not NRCS or its employees and representatives, is responsible for the final engineering design and performance of the application at hand. This software is supplied 'as is', and NRCS specifically excludes warranties, expressed or implied, as to the accuracy of the data generated by the use of this program and does not assume liability for any losses or damage resulting from the use of this program or the information supplied with it. NRCS does not warrant, guarantee, or make any representations regarding the use, or the results of use, of this software or accompanying information in terms of its accuracy, validity, completeness, applicability, or compliance with any regulatory code or governmental laws and regulations. Use of this software and information involves some risks, and the entire risk as to the results and performance of the software and accompanying information is the user's responsibility and liability.

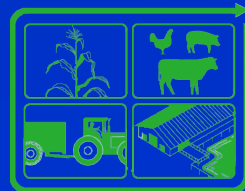
Continue



Animal Waste Management Computer Program

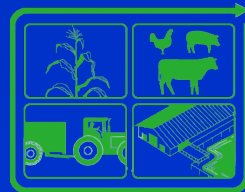
Objectives:

- Introduce the AWM computer program and explain what it does,
- Provide AWM support contact information, and
- Review each of the data input screens for sizing a waste storage or treatment facility.



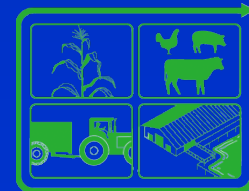
Required Materials

- USDA-NRCS Animal Waste Management Computer Program
 - <http://go.usa.gov/Zcr3>
- **USDA-NRCS Animal Waste Management Computer Program Video Tutorial.**
www.extension.org/pages/Animal_Waste_Management_Software_Training_Video
- **Supplemental Resources**
 - NRCS National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook.



What the AWM Program Does?

- **Planning/design tool for AFOs**
- **Estimates the production of:**
 - **manure**
 - **bedding**
 - **process water**
- **Determines the size of storage/treatment facilities**



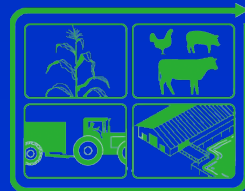
Animal Waste Management Computer Program

User Support

User support can be obtained from USDA-NRCS
National Technology Support Centers. Contact either:

Cherie Lafleur at (817)509-3303
cherie.lafleur@ftw.nrcs.usda.gov

Sally Bredeweg at (503) 273-2423
sally.bredeweg@por.usda.gov





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- Programs
- Newsroom
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Technical Resources

- Conservation Planning
- Ecological Science
 - Agronomy
 - Biology
 - Cultural Resources
 - Ecological Site Descriptions
 - Invasive Species & Pest Management
 - Manure & Nutrient Management
- Natural Resources Assessment
 - Data, Maps & Analysis
- Tools & Applications
 - Technical References
 - Field Office Technical Guide (FOTG)
 - Engineering
- Economics

Animal Waste Management Software

Introduction | Software | Training | Support short url to this page: http://go.usda.govZcr3

Training Material

- AWM 2.4 Operational Insights and Tips by Cherie LaFleur (pdf of powerpoint slides)
- AWM 2.4 Introduction (movie)
- AWM 2.4 Interface and Database (movie)
- Livestock Headquarters Resource Assessment Worksheet (movie)
- AWM 2.3 Training Video NC State University Agricultural Waste Management class video

Magazine article:
 AWM Publication (ASABE Resource Magazine)



Animal Waste Management Computer Program



Climate Screen

Climate Selection

Select Climate Data Source

Use AWM Database

Enter custom climate data for this job

Options for Evaluating Monthly Net Prec - Evap

If prec-evap < 0 then set net value to 0

Always set net value to prec-evap

Ignore evap value, and use prec. only

Select County: **CLACKAMAS**

Select Station: **N WILLAMETTE EXP STN OR6151**

25 Yr. - 24 Hr. Storm Precipitation: **4** inches

Lagoon Loading Rates:

Rational Design Method

Barth KVAL: **0**

Load Rate for Odor, OCV: **0** lbs VS/cu. ft/day

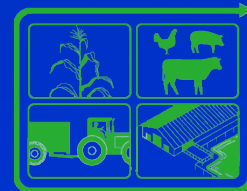
LRV Max: **0.0106** lbs VS/cu. ft/day

NRCS Design Method

Anaerobic Load Rate: **0** lbs VS/1000 cu. ft/day

	Prec (in)	Evap (in)
January	6.17	0.48
February	4.39	0.81
March	3.99	1.57
April	2.64	2.39
May	2.17	3.74
June	1.73	4.33
July	0.70	5.40
August	0.94	4.93
September	1.84	3.36
October	3.11	1.71
November	6.03	0.76
December	7.09	0.43
Total	40.80	29.91

Help OK



Animal Waste Management Computer Program



Climate Screen

Climate Selection
✕

Select Climate Data Source

Use AWM Database

Enter custom climate data for this job

Options for Evaluating Monthly Net Prec - Evap

If prec-evap < 0 then set net value to 0

Always set net value to prec-evap

Ignore evap value, and use prec. only

Enter County:

Enter Station:

25 Yr. - 24 Hr. Storm Precipitation: inches

Lagoon Loading Rates:

Rational Design Method

Barth KVAL:

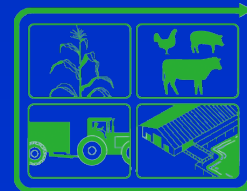
Load Rate for Odor, OCY: lbs VS/cu. ft/day

LRV Max: lbs VS/cu. ft/day

NRCS Design Method

Anaerobic Load Rate: lbs VS/1000 cu. ft/day

	Prec (in)	Evap (in)
January	0.00	0.00
February	0.00	0.00
March	0.00	0.00
April	0.00	0.00
May	0.00	0.00
June	0.00	0.00
July	0.00	0.00
August	0.00	0.00
September	0.00	0.00
October	0.00	0.00
November	0.00	0.00
December	0.00	0.00
Total	0.00	0.00



Animal Waste Management Computer Program



Animals Screen

Animals

Enter quantity and average weight

Animal	Animal Type	Quantity	Manure	VS	TS
			cu.ft/day	lbs/day	lbs/day
Totals					

Select Animals

Choices: Dry, Heifer

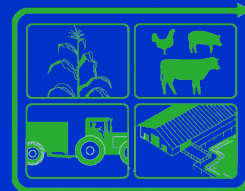
Animal Type: Dairy

Selected: Lactating Cow

Buttons: Add >, < Remove, Add All >>, << Remove All, OK, Cancel

Legend:
AU = Animal Unit
VS = Volatile Solids
TS = Total Solids

Buttons: New Animal, Delete Selected Row, Help, OK



Animal Waste Management Computer Program



Animals Screen

Enter the quantity and average weight in pounds for each animal selected.

Animals

Enter quantity and average weight of animals:

Select Animal New Animal Delete Selected Row

Animal	Animal	Quantity	Weight	Manure	VS	TS	Manure	VS	TS
	Type		lbs	cu.ft/day/AU	lbs/day/AU	lbs/day/AU	cu.ft/day	lbs/day	lbs/day
Dry	Dairy	0	0	1.30	8.10	9.50	0.00	0.00	0.00
Heifer	Dairy	0	0	1.30	7.77	9.14	0.00	0.00	0.00
Lactating Cow	Dairy	0	0	1.30	8.50	10.00	0.00	0.00	0.00
Totals		0	N/A	N/A	N/A	N/A	0.00	0.00	0.00

AU = Animal Unit
VS = Volatile Solids
TS = Total Solids

Help OK

Animal Waste Management Computer Program



Animals Screen

The screenshot shows the 'Animals' screen with a table of animal data and a 'Modify Animal Data' popup window. The popup window is currently open for a 'Lactating Cow' and displays various waste management parameters.

Animal	Animal Type	Quantity
Dry	Dairy	
Heifer	Dairy	
Lactating Cow	Dairy	
Totals		

Modify Animal Data

Animal Name: Lactating Cow

Manure Volume: 1.30 cu. ft/day/AU

Volatile Solids: 8.50 lbs/day/AU

Total Solids: 10.00 lbs/day/AU

Sludge Accum. Ratio: 0.0730

Flush Water Volume: 100.00 gal/day

Manure Master Only

Nitrogen: 4.30 lbs/ton

Phosphorous: 1.65 lbs/ton

Potassium: 6.04 lbs/ton

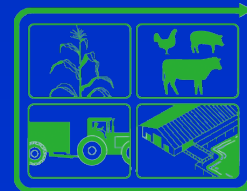
Lactating Cow

Buttons: Cancel, OK

Animal	Manure	VS	TS
	cu. ft/day	lbs/day	lbs/day
	18.20	113.40	133.00
	97.50	582.75	685.50
	253.50	1657.50	1950.00
	369.20	2353.65	2768.50

Revise animal data as need in the "Modify Animal Data" popup screen.

Double click on animal name.

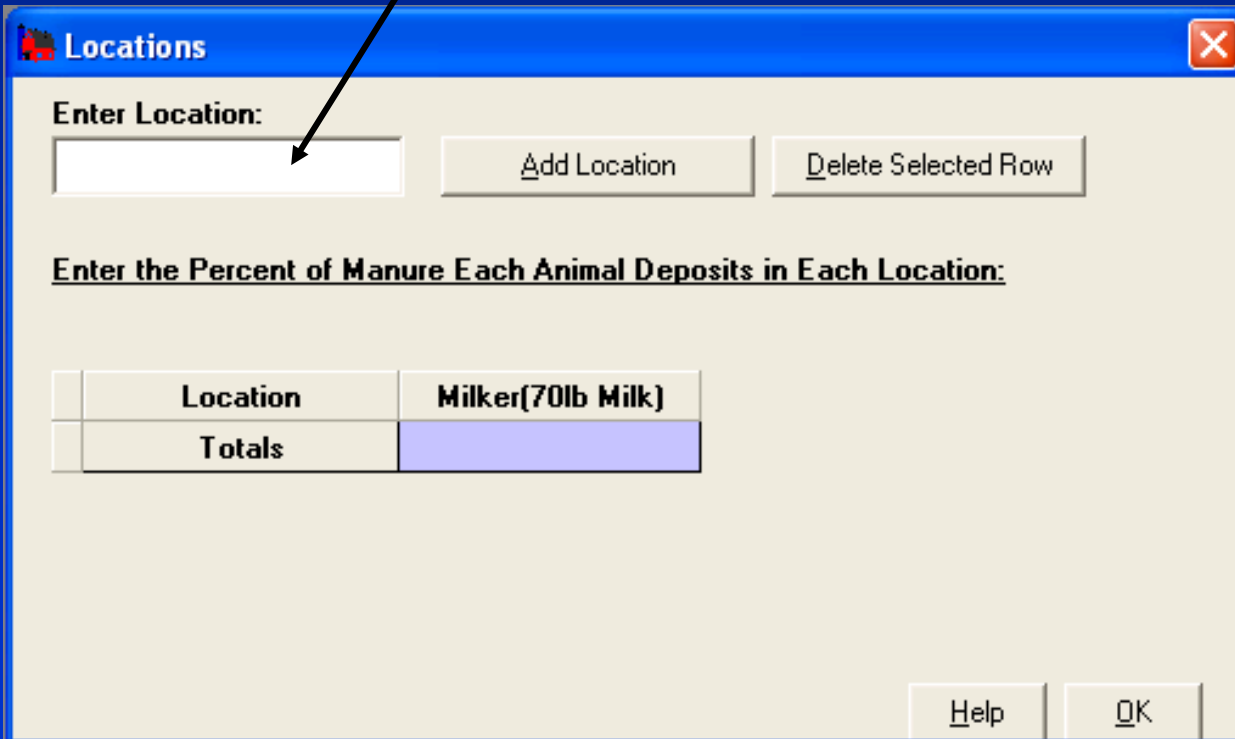


Animal Waste Management Computer Program

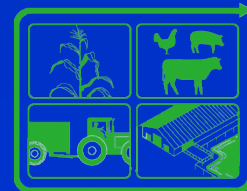


Locations Screen

Type in the name of a location
where animals spend time.

A screenshot of a software window titled "Locations". The window has a blue title bar with a close button (X) on the right. Below the title bar, there is a section labeled "Enter Location:" followed by a text input field. A black arrow points to this input field. To the right of the input field are two buttons: "Add Location" and "Delete Selected Row". Below this section is another section labeled "Enter the Percent of Manure Each Animal Deposits in Each Location:". Underneath this is a table with two columns: "Location" and "Milker(70lb Milk)". The table has two rows: the first row is empty, and the second row has "Totals" in the "Location" column and a light blue shaded cell in the "Milker(70lb Milk)" column. At the bottom right of the window are two buttons: "Help" and "OK".

Location	Milker(70lb Milk)
Totals	



Animal Waste Management Computer Program



Locations Screen

Enter the percent of manure each animal type deposits in each location.

Enter Location:

Add Location

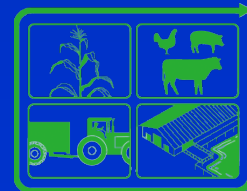
Delete Selected Row

Enter the Percent of Manure Each Animal Deposits in Each Location:

Location	Milker(70lb Milk)	Calf	Dry	Heifer
Milking Parlor	15			
Freestall Barn	0	100	60	60
Pasture	85		40	40
Totals	100	100	100	100

Help

OK



Animal Waste Management Computer Program



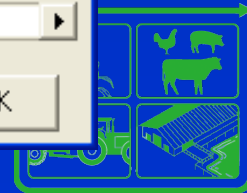
Additions Screen

Additions [Close]

Additional Waste Stream:

Note: Do not add recycled water. That has already been accounted for in the system. Only add newly introduced water to the system for wash and flush water.

Waste Streams	Wash Water	Flush Water	Bedding Type	Eff	Amount	LV Amt	CV Amt
--- Units --->	gal/day	gal/day		Density	lbs/day	cu ft/day	cu ft/day
Milking Parlor	400.00 ...	200.00 ...	Straw (loose)	0.25	1000.00	400.00	4000.00
Freestall Barns	0.00 ...	300.00 ...	Straw (loose)	0.25	1290.00	516.00	5160.00
Pasture	0.00 ...	0.00 ...		0.00	0.00	0.00	0.00
<i>Holding Area</i>	200.00 ...	0.00 ...		0.00	0.00	0.00	0.00



Animal Waste Management Computer Program



Runoff Screen

Runoff

Methods for determining monthly runoff volumes:

- 1.) Calculate volumes from climate and watershed data.
- 2.) Enter runoff volumes directly in the table on the right.

Runoff Volume Method

Calculate Monthly Runoff Volumes

Enter Monthly Runoff Volumes

Pervious Watershed Area: acres

Pervious Curve Number (1-day for 25-Yr 24-Hr Storm Runoff):

Pervious Curve Number for Monthly Runoff: (1-day) (30-day)

Impervious Area (roofs, slabs, etc): sq. ft.

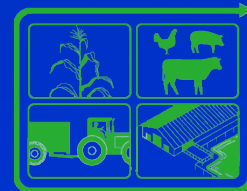
25 Yr-24 Hr Storm Runoff:

Runoff Volumes (1000 cu. ft)

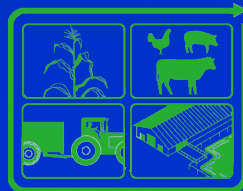
	Pervious	Impervious	Monthly Totals
January	0.00	0.00	0.00
February	0.00	0.00	0.00
March	0.00	0.00	0.00
April	0.00	0.00	0.00
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Total	0.00	0.00	0.00

WARNING: The volumes computed by the program are conservative over-estimates. The user is encouraged to use a method outside of the program to compute runoff volumes for larger watersheds and where precision is vital. Methods for computing monthly runoff volumes include the NEH-4 stream gauge procedure and SPAW.

Help
OK



- $CN_{30} = CN1 - (CN1 - ((CN1^{2.365})/631.79) - 15) \log 30$



Animal Waste Management Computer Program



Management Train Screen

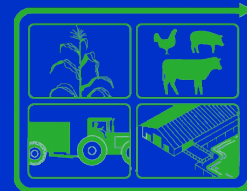
Management Train

Waste Stream	Step 1		Step 2	Step 3
Milking Parlor	Solid-Liquid Separator Static Inclined Screen 12 Mesh	---Liquids--> ---Solids-->	Storage Pond #1 Dry Stack (Uncovered) #1	
Freestall Barn				
Pasture				
Holding Area				

None (Clear)
 New Storage Pond
 New Storage Tank
 New Anaerobic Lagoon
Storage Pond #1

Component Volumes (cu. ft/day)

Component Name	Manure	Wash Water	Flush Water	Bedding	Total Waste Volume
Storage Pond #1	329.70	73.52	0.00	0.00	403.22
Dry Stack (Uncovered) #1	26.68	0.00	0.00	0.00	26.68



Animal Waste Management Computer Program



Design Screens

Design Waste Storage Structures

Dry Stack (Uncovered) #1

Input Data

Wall Height:

Storage Depth: ft

Input Dimension:

Bottom Width: ft

Freeboard: ft

Sideslope Ratio:

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Storage Period: months

Cross Section

Critical Months: **Mar - Aug** Bot W x L: 24.0 x 26.8 ft Top W x L: 8.0 x 4.8 ft

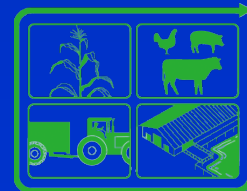
Facility Options

Set Wall Height

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	0.44	0.41	0.44	0.43	0.44	0.43	0.44	0.44	0.43	0.44	0.43	0.44	5.20
Storage Volume	0.44	0.41	0.44	0.43	0.44	0.43	0.44	0.44	0.43	0.44	0.43	0.44	

Help OK



Animal Waste Management Computer Program



Design Screens

Design Waste Storage Structures

Storage Pond #1

Input Data

Shape: **Rectangle**

Total Depth: **10.0** ft

Input Dimension: **Bottom Width**

Bottom Width: **150.0** ft

Permanent Add'l Storage: **0** cu. ft

Sideslope Ratio: **3**

Max. Storage Volume Method

Define Withdrawal Months

Define Storage Period

Storage Period: **6** months

Cross Section

Critical Months: **Oct - Mar** Bot W x L: 150.0 x 197.0 ft Top W x L: 210.0 x 257.0 ft

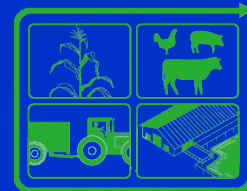
Facility Options

Include Soil Liner Include Ramp

Water Budget (1000 cu ft)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Waste	32.20	30.13	7.69	7.44	7.69	7.44	7.69	7.69	7.44	7.69	31.16	32.20	186.45
Runoff	14.94	8.91	7.64	3.69	2.49	1.52	0.11	0.29	1.75	4.98	14.44	18.19	78.97
Prec-Evap	26.13	17.02	12.66	3.83	-2.82	-6.79	-15.02	-12.36	-3.03	8.23	24.56	30.44	
Storage Volume	73.28	56.05	27.99	14.96	7.35	2.17	0.00	0.00	6.16	20.90	70.16	80.83	

Stage Storage Curve Help QK



Animal Waste Management Computer Program

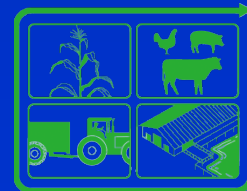
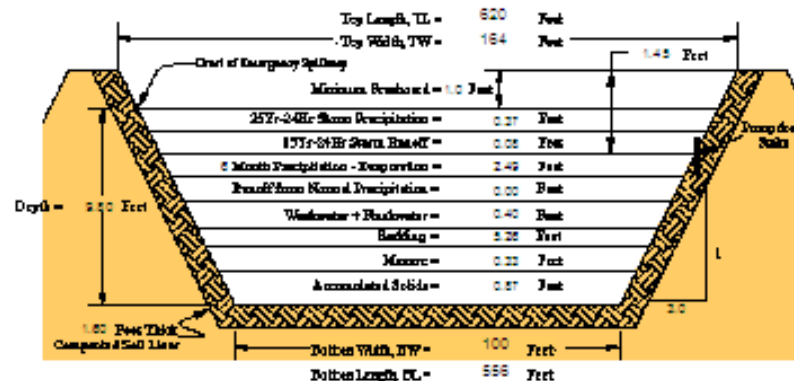
Reports

AWM

Waste Storage Pond Data for: Example Design

Designed by: B Wilson

Facility	Rectangular Storage Pond #1	
Storage Period	6 Months	
Manure	23,682 Cubic Feet	177,142 Gallons
Bedding	378,905 Cubic Feet	2,811,771 Gallons
Flush Water	7,180 Cubic Feet	53,705 Gallons
Wash Water	21,537 Cubic Feet	161,094 Gallons
Normal Rain and 25Yr-24Hr Storm Runoff from Drainage Area	6,990 Cubic Feet	52,285 Gallons
Normal Rain plus 25Yr- 24Hr Storm on pond surface Area minus Evaporation	259,636 Cubic Feet	1,942,080 Gallons
Accumulated Solids	50,000 Cubic Feet	374,000 Gallons
Total Volume to Store	744,927 Cubic Feet	5,572,057 Gallons
Total Volume of Pond	744,927 Cubic Feet	5,572,057 Gallons



Animal Waste Management Computer Program

Questions?

