

Rule Summary and Fiscal Analysis (Part A)**Department of Agriculture**

Agency Name

Livestock Environmental Permitting

Division

William A. Hopper, Jr.

Contact

8995 E. Main St. Reynoldsburg OH 43068-3399

Agency Mailing Address (Plus Zip)

614-728-6430

Phone

614-995-4585

Fax

901:10-1-01

Rule Number

AMENDMENT

TYPE of rule filing

Rule Title/Tag Line

Definitions.**RULE SUMMARY**

1. Is the rule being filed consistent with the requirements of the RC 119.032 review? **Yes**

2. Are you proposing this rule as a result of recent legislation? **No**

3. Statute prescribing the procedure in accordance with the agency is required to adopt the rule: **119.03**

4. Statute(s) authorizing agency to adopt the rule: **903.08, 903.10**

5. Statute(s) the rule, as filed, amplifies or implements: **903.01, 903.02, 903.04, 903.07, 903.08, 903.081, 903.082, 903.09, 903.10**

6. State the reason(s) for proposing (i.e., why are you filing,) this rule:

To correct typographical and grammatical errors.

To change drainageway to field surface furrow. Drainageway is a term used in Ohio EPA's water quality standards as a use designation for waters of the state. Field surface drains or (now) furrows are the opposite, i.e., not waters of the state.

7. If the rule is an AMENDMENT, then summarize the changes and the content of the proposed rule; if the rule type is RESCISSION, NEW or NO CHANGE,

then summarize the content of the rule:

901:10-1-01 (A): Correct spelling of word "pollution".

901:10-1-01(EE): remove

901:10-1-01 (FF)(1) Nd (2): grammatical corrections

901:10-1-01 (II): change "refer" to "refers"

901:10-1-01(KK): add "Field surface furrow means an area of short-term low-gradient..."

901:10-1-01 (FFF)(3): change "insect rodent and control" to "insect and rodent control"

901:10-1-01 (EEEE): change "principle" to "principal"

8. If the rule incorporates a text or other material by reference and the agency claims the incorporation by reference is exempt from compliance with sections 121.71 to 121.74 of the Revised Code because the text or other material is **generally available** to persons who reasonably can be expected to be affected by the rule, provide an explanation of how the text or other material is generally available to those persons:

Sections 121.71 et seq. do not apply because the information is readily intelligible to persons expected to be effected by the rule, available at either [www.ohioline.osu.edu.lines.stock.html# Facilities](http://www.ohioline.osu.edu.lines.stock.html#Facilities) or at www.oh.nrcs.gov/., and specifies the date or edition of the documents incorporated.

9. If the rule incorporates a text or other material by reference, and it was **infeasible** for the agency to file the text or other material electronically, provide an explanation of why filing the text or other material electronically was infeasible:

Sections 121.71 et seq. do not apply because the information is readily intelligible to persons expected to be effected by the rule, available at either [www.ohioline.osu.edu.lines.stock.html# Facilities](http://www.ohioline.osu.edu.lines.stock.html#Facilities) or at www.oh.nrcs.gov/., and specifies the date or edition of the documents incorporated.

10. If the rule is being **rescinded** and incorporates a text or other material by reference, and it was **infeasible** for the agency to file the text or other material, provide an explanation of why filing the text or other material was infeasible:

Not Applicable.

11. If **revising** or **refiling** this rule, identify changes made from the previously filed version of this rule; if none, please state so:

Not Applicable.

12. 119.032 Rule Review Date: **11/9/2006**

(If the rule is not exempt and you answered NO to question No. 1, provide the scheduled review date. If you answered YES to No. 1, the review date for this rule is the filing date.)

NOTE: If the rule is not exempt at the time of final filing, two dates are required: the current review date plus a date not to exceed 5 years from the effective date for Amended rules or a date not to exceed 5 years from the review date for No Change rules.

FISCAL ANALYSIS

13. Estimate the total amount by which *this proposed rule* would **increase / decrease** either **revenues / expenditures** for the agency during the current biennium (in dollars): Explain the net impact of the proposed changes to the budget of your agency/department.

This will have no impact on revenues or expenditures.

\$0

This rule will have no impact on revenues or expenditures.

This rule will have no impact on the budget.

14. Identify the appropriation (by line item etc.) that authorizes each expenditure necessitated by the proposed rule:

Item 700-418

Expenditure: Not Applicable

15. Provide a summary of the estimated cost of compliance with the rule to all directly affected persons. When appropriate, please include the source for your information/estimated costs, e.g. industry, CFR, internal/agency:

Industry standards and specifications put into rule. The cost of compliance is minimal if in compliance with the rules.

16. Does this rule have a fiscal effect on school districts, counties, townships, or municipal corporations? **No**

17. Does this rule deal with environmental protection or contain a component dealing with environmental protection as defined in R. C. 121.39? **Yes**

You must complete the Environmental rule Adoption/Amendment Form in order to comply with Am. Sub. 106 of the 121st General Assembly.

Page E-1

Rule Number: 901:10-1-01

Environmental Rule Adoption/Amendment Form

Pursuant to Am. Sub. H.B. 106 of the 121st General Assembly, prior to adopting a rule or an amendment to a rule dealing with environmental protection, or containing a component dealing with environmental protection, a state agency shall:

- (1) Consult with organizations that represent political subdivisions, environmental interests, business interests, and other persons affected by the proposed rule or amendment.
 - (2) Consider documentation relevant to the need for, the environmental benefits or consequences of, other benefits of, and the technological feasibility of the proposed rule or rule amendment.
 - (3) Specifically identify whether the proposed rule or rule amendment is being adopted or amended to enable the state to obtain or maintain approval to administer and enforce a federal environmental law or to participate in a federal environmental program, whether the proposed rule or rule amendment is more stringent than its federal counterpart, and, if the proposed rule or rule amendment is more stringent, the rationale for not incorporating its federal counterpart.
 - (4) Include with the proposed rule or rule amendment and rule summary and fiscal analysis required to be filed with the Joint Committee on Agency Rule Review information relevant to the previously listed requirements.
-

(A) Were organizations that represent political subdivisions, environmental interests, business interests, and other persons affected by the proposed rule or amendment consulted ? **Yes**

Please list each contact.

Please see attachment 1 of 901:10-1-01

(B) Was documentation that is relevant to the need for, the environmental benefits or consequences of, other benefits of, and the technological feasibility of the proposed rule or amendment considered ? **Yes**

Please list the information provided and attach a copy of each piece of documentation to this form. (A SUMMARY OR INDEX MAY BE ATTACHED IN LIEU OF THE ACTUAL DOCUMENTATION.)

Please see attachment 2 of 901:10-1-01

(C) Is the proposed rule or rule amendment being adopted or amended to enable the state to obtain or maintain approval to administer and enforce a federal

environmental law or to participate in a federal environmental program ?
Yes

Is the proposed rule or rule amendment more stringent than its federal counterpart ? **No**

(D) If this is a rule amendment that is being adopted under a state statute that establishes standards with which the amendment is to comply, is the proposed rule amendment more stringent than the rule that it is proposing to amend? **No**

Not Applicable

Environmental Rule Adoption/Amendment Form
Attachment 1

Contact List:

Deb Abbott, ODA
Yvonne Ackerman, Ohio Farmers Union
Jack Advent, Ohio Veterinary Medical
Doug Alderman, Burch Hydro
Cathy Alexander, OEPA
Tom Allen, OEPA
Bob Anderson, Paulding County Commissioners
Marilyn Baker, Ohio Farm Bureau
Ron Baldrich, Attowa Vet Clinic
Tim Barnes
Fred Bartenstein, Fred Bartenstein & Assoc.
Robert Bear, Concerned Citizens
Rosella Bear, Concerned Citizens
Brad Biggs, ODOD
Dan Binder, Ohio Environmental Council
Richard Bodenbender, Citizens of Putnam County
Gary Bowman, OSU
Scott Briggs, Tuscarawas SWCD
Beverly Byrum, ODA
James Carey, Concerned Citizens
Jim Chakeres, Ohio Sheep Improvement Assn.
Don Clark, ODOD
William Cleland, Jr.
Michael Cochran, Ohio Township Assn.
Diane Conley, ODA
Kim Coy, Akron City Water Supply
Fred Dailey, ODA
Matt Davis, Ohio Pork Producers
Fred DeCamp
Vicki Deisner, Ohio Environmental Council
Tim Demland, Ohio Dairy Farmers Federation
Chuck Divelbiss, Licking County Concerned Citizens
John Douglass, Catalpadale Farms
Freda Douthitt, Licking County Citizens
Fritz Douthitt, Licking County Citizens
Sereana Dresbach, ODA
Maurice Eastridge, OSU
Michael Eggert, OEPA
Kevin Elder, ODA
Norman Fausey, USDA-ARS
Glen Feichtner, Ohio Cattlemen's Assn.

Jennifer Firth, Ohio Environmental Council
Henry Fisher, NRCS
Kit Fogle, Ohio Farmers Union
Kristi Ford, ODA
Tony Forshey, OVMA
Stephen Foster, OSU
Heidi Fought, Ohio Township Assn.
Andrew Franks, Ohio Farmers Union
Jerry Freewalt, Ohio Catholic Rural Life
Julie Funk, OSU
Larry Gearhardt, AgPro, Inc.
Mary Gibson
David Glauer, ODA
Dr. Glauer, ODA
Ralph Haefner, USGS
Tom Hafer, Marion SWCD
Joe Haines, ODA
Amanda Hargett, OSU Extension
Elizabeth Harsh, Ohio Cattlemen's Assn.
Terry Haworth, Darke County Commissioner
Jack Heavenridge, Ohio Poultry Assn.
Bernard Heisner, COBA/Select Sires, Inc.
Tom Hertzfeld, Sr., Ohio Poultry Assn.
Kent Hoblet, OSU
Leo Homan, Ohio Farmers Union
Jim Hoops, State Representative
Pat Hord
Dick Isler, Ohio Pork Producers
Peggy Jackson, ODA
Lewis Jones, ODA
Martin Joyce, ODNR-DSWC
Ron Kadesch, Ohio Family Farm Coalition
Vicki Kadesch, Pauling County First
John Kahle, Citizens of Putnam County
Janice Kennedy, Concerned Citizens
John Kessler, OEPA
Becky Kibler, Concerned Citizens
Jeff Layman, OSU
Ritchie Laymon, Ohio Law Coalition
Jeff LeJeune, OSU
Maggie Lewis, OCDRCM
David Linkhart, OFSWCD
William Long, Ohio Farm Family Coalition
Dick Lorenz, Westerville Water Division
Lenny Losh
Ed Luersman, Ohio Family Farm Coalition

Laddie Marous, Ohio State Grange
John McCarthy, AP
Alice McKenney, Tuscarawas SWCD
Shannon McQuade, ODA
Thomas Menke, Menke Consulting, Inc.
Terry Mescher, ODNR-DSWC
Mike Monnin, NRCS
Bobby Moser, OSU
Michael Mull, Ohio Veterinary Medical
Paul Novak, OEPA
Lisa Pfeifer, OSU
Irene Probasco, Ohio Alliance for the Environment
Dean Putt, dairy farmer
Nancy Raeder, Ohio Farm Family Coalition
John Rausch, OSU - Extension
Christina Ritchey Wilson, Ohio Env. Health Assn.
Rob Russell, Protect Our Earth's Trees
Bill Saville, OSU
Peter Schade, Cuyahoga Co. Health Dept.
David Schleich, ODA
Heather Schofield, Ohio Dairy Farmers Federation
Mike Schroeder, Windmill Swine Farms
Barb Serve, ODA
Fred Shimp, ODA
Rendell Shira, Burch Hydro
William Shulaw, OSU
William Skelding, ODA
George Slater
Brent Sohngen, OSU
Tom Sporleder, OSU
Keith Stimpert, Ohio Farm Bureau
Ben Stinner, Ohio Alliance for the Environment
Ralph Stonerock, Akey, Inc.
Susan Studer King, Ohio Environmental Council
Cheryl Subler, County Commissioners Assn.
Susan Sutherland, Ohio Environmental Health Assn.
Scott Sutliff, OEPA
Mac Swinford, ODNR-Geo Survey
Lindsay Taliaferro, OEPA
Lisa Tharp, Ohio State Grange
Jenny Tiell, ODA
Jim Tobin, Catholic Conference of Ohio
Curtis Truss, Ohio Water Environment Assn.
Larry Vance, ODNR-DSWC
Maurice Wannemalher, Paulding County Commissioners
Tim Weaver, Ohio Poultry Assn.

Dave White, Ohio Livestock Coalition
Norman Widman, NRCS
Mark Wilson, ODA
Rick Wilson, OEPA
Jim Young, OFSWCD

Environmental Rule Adoption/Amendment Form
Attachment 2

Index List:

APHA (1992) *Standard methods for examination of water and wastewater* (18th edition). New York, NY.

American Concrete Institute. 1992. *360R. Design of Slabs on Grade*. Farmington Hills, MI.

American Concrete Institute. 1999. *318. Building Code Requirements for Structural Concrete*. Farmington Hills, MI.

American Concrete Institute. (1999). *530. Building Code Requirements for Masonry Structures*, Farmington Hills, MI.

American Society of Agricultural Engineers (2001), Standards Engineering Practices Data,

American Society of Agricultural Engineers (2001). *Standards Engineering Practices Data. Data EP379.2. Control of Manure Odors*. St. Joseph, MI.

American Society of Agricultural Engineers Standards 2001. Standards Engineering Practices Data EP288.5 Agricultural Building Snow and Loads. St. Joseph, MI.

American Society of Agricultural Engineers Standards 2001. Standards Engineering Practices Data EP378.3 Floor and Suspended Loads on Agricultural Structures Due to Use. St. Joseph, MI.

American Society of Agricultural Engineers Standards 2001. Standards Engineering Practices Data EP393.3 Manure Storage. St. Joseph, MI.

American Society For Testing and Materials (2001) Practice D2488-00 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). West Conshohocken, PA.

American Society For Testing and Materials (2000) Terminology D653-97 Standard Terminology Relating to Soil, Rock, and Contained Fluids. West Conshohocken, PA.

Andraski, T.W., L.G. Bundy and K.R. Brye. (2000) Crop management and corn nitrogen rate effects on nitrate leaching. *Journal of Environmental Quarterly* 29: 1095-1103.

Araji, A.A., and Z.O. Abdo, and P. Joyce (2001). Efficient use of animal manure on cropland: economic analysis. *Biosource Technology* 79: 179-191.

***Arnold, G.J., R. Stowell and B. Strobel (1998). Manure Pit Ventilation Systems for Swine Operating Principles. AEX-150-98. Ohio State University Extension: Columbus, OH**

Barth, Clyde (1987) Operation and Maintenance of Livestock Waste Lagoons, Agricultural Manure Utilization and Management, American Society of Agricultural Engineers. St. Joseph, MI

Barth, Clyde and Jelle Kroes (1985) Livestock Manure Lagoon Sludge Characterization. Agricultural Manure Utilization and Management, *Proceedings of the Fifth International Symposium on Agricultural Manure*. American Society of Agricultural Engineers. St. Joseph, MI pp. 660-671

- Barth, Clyde (1985) *The Rational Design Standard for Anaerobic Livestock lagoons, Agricultural Manure Utilization and Management, Proceedings of the Fifth International Symposium on Agricultural Manure*. American Society of Agricultural Engineers. St. Joseph, MI p. 638-647.
- *Chapman, S.L., G. Huitink, L. Barton, C.S. Snyder, and B.J. Hankins (1992). Best management guidelines for land application of dry poultry litter. *Water Quality Information Article I-92*. University of Arkansas, Cooperative Extension Service Bulletin, Little Rock, AR
- Chapman, S.L. (1995) Soil and solid poultry waste nutrient management and water quality. *Poultry Science* 75: 862 –866.
- Cornell and Penn State Cooperative Extension, “Pest Management Recommendations for Dairy Cattle,” Donald A. Rutz and Christopher J. Geden, Department of Entomology, Cornell University, and Charles W. Pitts, Department of Entomology, Penn State.
- Cornell University, Cornell Cooperative Extension, Department of Entomology, “Integrated Management of Flies in and around Dairy and Livestock Barns,” D. Wes Watson, J. Keith Waldron, and Donald A. Rutz, June 1994.
- David, M.B., L.E. Gentry, D.A. Kovacic, and K.M. Smith (1997). Nitrogen balance in and export from an agricultural watershed. *Journal of Environmental Quality* 26: 1038-1048.
- *Eastridge, M.L. and S. Steele (2001). Questions Pertaining to Large Dairy Enterprises in Ohio: Regulations. AS-0008-01. Ohio State University Extension: Columbus, OH
- *M.L. Eastridge and S. Steele (2001). Questions Pertaining to Large Dairy Enterprises in Ohio: Regulations. AS-0009-01. Ohio State University Extension: Columbus, OH
- *M.L. Eastridge and S. Steele (2001). Questions Pertaining to Large Dairy Enterprises in Ohio: Regulations. AS-0010-01. Ohio State University Extension: Columbus, OH
- *M.L. Eastridge and S. Steele (2001). Questions Pertaining to Large Dairy Enterprises in Ohio: Regulations. AS-0011-01. Ohio State University Extension: Columbus, OH
- *Eghball, B., J.E. Gilley, L.A. Kramer, and T.B. Moorman (2000). Narrow grass hedge effects on phosphorus and nitrogen in runoff following manure and fertilizer application. *Journal of Soil and Water Conservation*. 55(2): 172-176.
- Eghball, B., G.D. Binford, and D.D. Baltensperger (1996). Phosphorus movement and adsorption in a soil receiving long-term manure and fertilizer application. *Journal of Environmental Quality* 25: 1339-1343.
- Gilley, J.E. and L.M. Risse (2000). Runoff and soil loss as affected by the application of manure. *American Society of Agricultural Engineers*. Vol. 43(6): 1583 – 1588.
- Godwin, D.C. and J.R. Miner (1996). The potential of off-stream livestock watering to reduce water quality impacts. *Biosource Technology* 58: 285-290.
- Govindasamy, R., M. J. Cochran and E. Buchberger (1994). Economic implications of phosphorus loading policies for pasture land applications of poultry litter. *Water Resources Bulletin Paper Number* 93116 Vol. 30, No. 5: 901-910.

Henry, G.M., M.A. DeLorenzo, D.K. Beede, H.H. Van Horn, C.B. Moss and W.G. Boggess (1995). Determining optimal nutrient management strategies for dairy farms. *Journal of Dairy Science* 78: 693-703.

Insect and rodent control, rule 901:3-10-29 of the Ohio Administrative Code.

Insect, rodent and animal control, rule 901:3-2-15 of the Ohio Administrative Code.

Janzen, R.A., W.B. McGill, J.J. Leonard and S.R. Jeffery (1999). Manure as a resource – ecological and economic considerations in balance. *American Society of Agricultural Engineers* Vol. 42(5): 1261-1273.

Kohn, R.A., Z. Dou, J.D. Ferguson and R.C. Boston (1997). A sensitivity analysis of nitrogen losses from dairy farms. *Journal of Environmental Management* 50: 417-428.

Kudva, I.T., K. Blanch and C.J. Hovde (1998). Analysis of escherichia coli O157:H7 survival in ovine or bovine manure and manure slurry. *Applied and Environmental Microbiology* 64: 3166-3174.

Lanyon, L.E. (1994). Dairy manure and plant nutrient management issues affecting water quality and the dairy industry. *Journal of Dairy Science* 77: 1999-2007.

***Leeds, R., L.C. Brown, M.R. Sulc, and L.VanLieshout (1994). Vegetative Filter Strips: Application, Installation and Maintenance. AEX-467-94. Ohio State University Extension: Columbus, OH**

***Mancl, K. and M.A. Veenhuizen (1991). Avoiding Stream Pollution from Animal Manure. AEX-708-91. Ohio State University Extension: Columbus, OH**

Manual of Steel Construction. 1991. American Institute of Steel Construction. Chicago, IL

Manure Storages: MWPS-18 Section 2 (2001). C. Fullhage (University of Missouri), J. Hoehne (University of Missouri), D. Jones (Purdue University), R. Koelsch (University of Nebraska). Iowa State University, Ames, Iowa.

Midwest Plan Service. 1994. Concrete Manure Storages Handbook, Iowa State University, Ames, Iowa.

Midwest Plan Service, 1987. Beef Housing and Equipment Handbook, MWPS-6. Iowa State University, Ames, IA.

MidWest Plan Service, 2000. Manure Characteristics – Manure Management Systems Series, MWPS-18 Section 1. Iowa State University, Ames, IA.

MidWest Plan Service, 2000. Dairy Freestall Housing and Equipment, MWPS-7

MidWest Plan Service. 1993. Livestock Waste Facilities Handbook, MWPS-18, all chapters. Iowa State University, Ames, IA.

Midwest Plan Service, TR-9: Circular Concrete Manure Tanks, March 1998, Iowa State University, Ames, IA.

MidWest Plan Service Bulletin, MWPS-TR-9; 18-52; 18-51?????????

- Midwest Plan Service, 1983, Swine Housing and Equipment Handbook. MWPS-08, Iowa State University, Ames, IA.**
- Miner, J.R. (1997) Nuisance concerns and odor control. *Journal of Dairy Science* 80: 2667-2672**
- Miner, J.R. (1999). Alternatives to minimize the environmental impact of large swine production units. *Journal of Animal Sciences*. 77:440-444.**
- Mississippi State University, Mississippi State Extension Service, "Control Commensal Rodents In Poultry Houses," December 2, 1999.
- Moore, P.A. Jr., T.C. Daniel, A.N. Sharpley and C.W. Wood (1995). Poultry manure management: Environmentally sound options. *Journal of Soil and Water Conservation* 50(3): 321-327.**
- Mueller, D.H., R.C. Wendt and T.C. Daniel (1984). *Journal of the Soil Science Society of America* 48:901-905.**
- National Design Specifications for Wood Construction (1997), American Forest and Paper Association in 1997 National Design Specifications, International Conference of Building Officials. Whittier, CA.
- National Design Specification, 1999, NDS for Wood Construction.**
- North Central Regional Research Publication No. 284, Manure Digestion, Runoff, Refeeding, Odors, MWPS-25, Iowa State University, Ames, Iowa.**
- North Dakota Agricultural Experiment Station. Recommended Chemical Soil Test Procedures for the North Central Region, North Central Region Committee on Soil Testing and Plant Analysis (NCR#13). USDA Natural Resources Conservation Service. 1992. National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, all chapters, USDA, Washington D.C.
- Northeast Regional Agricultural Engineering Service, Dairy Free Stall Housing (1986), Harrisburg, PA.**
- Northeast Regional Agricultural Engineering Service, Dairy Manure Management, NRAES-31, 1989, Syracuse, New York.**
- Northeast Regional Agricultural Engineering Service, Dairy Manure Management from Barn to Storage. NRAES-108, 1998, Ithaca, New York.**
- Northeast Regional Agricultural Engineering Service, Dairy Reference Manual, 3rd Edition, NRAES-63, Pennsylvania State University.**
- Northeast Regional Agricultural Engineering Service, Designing a Modern Milking Center, NRAES-73, Rochester, New York.**
- Northeast Regional Agricultural Engineering Service, Animal Behavior and the Design of Livestock and Poultry Systems, 1995, Indianapolis, Indiana.**
- Northeast Regional Agricultural Engineering Service, On Farm Composting Handbook, NRAES-54, Ithaca, New York.**

- Northeast Regional Agricultural Engineering Service, Earthen Manure Storage Design Considerations, 1999, Ithaca, New York.**
- Northeast Regional Agricultural Engineering Service, Cooperative Extension; Guideline for Milking Center Wastewater (1998). Ithaca, New York.**
- Northeast Regional Agricultural Engineering Service, Liquid Manure Application Systems Design Manual.**
- Northeast Regional Agricultural Engineering Service (1998). Liquid manure application systems design manual. Cooperative. Ithaca, NY: Cornell University-Cooperative Extension.**
- Northeast Regional Agricultural Engineering Service (1997), Post-Frame Building Handbook, Materials, Design Considerations, Construction Procedures**
- Northeast Regional Agricultural Engineering Service, 1999, Poultry Waste Management Handbook, NRAES-32, Ithaca, New York.**
- Northeast Regional Agricultural Engineering Service, Private Drinking Water Supplies, NRAES-47, Ithaca, New York.**
- Ohio Department of Natural Resources (1996). *Rainwater and Land Development: Ohio Standards (Second edition)*. D. Mecklenberg (ed.). Columbus, OH.**
- Ohio Department of Natural Resources (1999). Evaluating Ground Water Pollution Potential in Ohio (Drastic).**
- Ohio Livestock Manure And Wastewater Management Guide - Bulletin 604. M. A. Veenhuizen, D.J. Eckert, K. Elder, J.W. Johnson, W.F. Lyon, K.M. Mancl and G. Schnitkey (1992). Columbus, OH: Ohio State University.**
- The Ohio State University, College of veterinary medicine, "Rodent Control," Grasso M. Ebako, DVM, MS, MS.
- The Ohio State University, Ohio State University Extension, Livestock and Livestock Building Pest Management, Using Fly Parasites with Chemicals, Bulletin 473."
- The Ohio State University, Ohio State University Extension, "Poultry Pest Management Bulletin 853," William R. Lyon, 1995.
- The Ohio State University, Ohio State University Extension, "Pet Pest Management Bulletin 586," William R. Lyon, 1997.
- Parsons, R.L., J.W. Pease, and D.J. Bosh (1995) Simulating nitrogen losses from agricultural land: Implications for water quality and protection policy. Water Resources Bulletin, American Water Resources Association 31(6): 1079-1087.**
- Pest Management Recommendations for Poultry, (2000) Department of Entomology, Penn State.**
- Purdue University, Department of Entomology, Ralph E. Williams, "Focus on Flies: The Integrated Pest Management Approach."

- Purdue University Extension, Using the Presidedress Nitrate Soil Test (PSNT) to Predict N Needs for Corn, David Mengel, Extension Agronomist, AGRY 96-09 Purdue University, West Lafayette, Indiana.
- Sauer, T.J., T.C. Daniel, P.A. Moore, Jr., K.P. Coffey, D.J. Nichols, and C.P. West (1999). Poultry litter and grazing animal waste effects on runoff water quality. *Journal of Environmental Quality* 28: 860-865.
- Sharpley, A. and B. Moyer (2000). Phosphorus forms in manure and compost and their release during simulated rainfall. *Journal of Environmental Quality* 29: 1462-1469.
- *Simeral, K.D. (1998). Using Constructed Wetlands for Removing Contaminants from Livestock Wastewater. A-5-98. Ohio State University Extension: Columbus, OH
- Tri-State Fertilizer Recommendations for Corn, Soybeans, Wheat and Alfalfa. Bulletin E-2567. East Lansing Michigan; Michigan State University. M.L. Vitosh (Michigan State University), J.W. Johnson (The Ohio State University), and D.B. Mengel (Purdue University). (1995).
- The University of Florida, "Book of Insect Records," Department of Entomology and Nematology University of Florida, Gainesville, 2002.
- The University of Georgia-Department of Entomology, "Fly Control in Livestock Facilities, Dairy Barns, Swine Barns, Livestock Sheds, Other Animal Buildings," Craig Sheppard, Entomologist, March 6, 2001.
- The University of Nebraska, Institute of Agriculture and Natural Resources, "Insects and Pests" 2001.
- USDA- Natural Resources Conservation Service (2001). *Field Office Technical Guide: Section IV*. Washington, DC/Columbus, OH.
- USDA Natural Resources Conservation Service (2000). Conservation Practice Standard, CODE 359. Washington DC/Columbus, OH.
- USDA-Natural Resources Conservation Service (2001). *Field Office Technical Guide: Section IV Conservation Practice Standard. Practice Nutrient Management Code 590*. Columbus, OH.
- USDA- Natural Resources Conservation Service Conservation Practice Standard, Pest Management," Code 595, March, 2001.
- USDA-Natural Resources Conservation Service (2001). Field Office Technical Guide Conservation Practice Standard. Waste Utilization Code 633. Columbus, OH.
- USDA-Natural Resources Conservation Service, National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 7, Amendment OH7, Geology and Groundwater Considerations, May, 1999
- USDA-Natural Resources Conservation Service, National Engineering Handbook, Part 651, Agricultural Manure Management Field Handbook, Chapter 10, Amendment OH6 Settling Basin\Lagoon, April, 1998.
- USDA Natural Resources Conservation Service. 1992. National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, all chapters, USDA, Washington D.C.
- USDA-Natural Resources Conservation Service (2000). *National Engineering Handbook-Part 651: Agricultural Waste Management Field Handbook*. Washington, DC.

USDA-Natural Resources Conservation Service (2001). *National Soil Survey Handbook*. Washington, DC.

USDA-Natural Resources Conservation Service (1997). *Engineering Field Manual: Chapters 1-19*. Washington, DC.

USDA-Natural Resources Conservation Service (2000). *National Engineering Handbook-Part 393 Filter Strip Field Handbook*. Washington, DC.

USDA-Natural Resources Conservation Service (2000). *National Engineering Handbook-Part 412: Grass Waterways Field Handbook*. Washington, DC.

USDA-Natural Resources Conservation Service (2000). *National Engineering Handbook-Part 521-F Pond Sealing and Lining Field Handbook*. Washington, DC.

USDA-Natural Resources Conservation Service (2000). *National Engineering Handbook-Part 561: Filter Strips Field Handbook*. Washington, DC.

USDA-Natural Resources Conservation Service, Concrete Construction specification 210-VI-EFH, Amend OH-17, February 14, 2000.

USDA Soil Conservation Service, 1989, Technical Release 74, Lateral Earth Pressures.

Van Horn, H.H., A.C. Wilkie, W.J. Powers and R.A. Nordstedt (1993). Components of dairy manure management systems. *Journal of Dairy Science* 77: 2008-2030.

Veenhuizen, M.A., D.J. Eckert, K. Elder, J. Johnson, W.F. Lyon, K.M. Mancl, and G. Schnitkey (eds.) (1992). *Ohio Livestock Manure And Wastewater Management Guide*. Bulletin 604. Ohio State University Extension: Columbus, OH

Wilkerson, V.A., D.R. Mertens, and D.P. Casper (1997). Prediction of excretion of manure and nitrogen by Holstein dairy cattle. *Journal of Dairy Science* 80: 3193-3204.

Zahn, J.A., J.L. Hatfield, Y.S. Do, A.A. DiSpirito D.A. Laird, and R.L. Pfeiffer (1997). Characterization of volatile organic emissions and wastes from a swine production facility. *Journal of Environmental Quality* 26: 1687-1696.

Zahn, J.A., J.L. Hatfield, D.A. Laird, T.T. Hart, Y.S. Do, and A.A. DiSpirito (2001). Functional classification of swine manure management systems based on effluent and gas emission characteristics. *Journal of Environmental Quality* 30: 635-647.

Zublena, J.P., J.C. Barker, J.W. Parker, and C.M. Stanislaw (1993). *Soil facts: swine manure as fertilizer source*. North Carolina Cooperative Extension Service, Statesville, NC.