

Resources for Ventilation of Livestock Housing

Agricultural and Biological Engineering

abe.psu.edu

Eileen Fabian-Wheeler, Professor of Agricultural Engineering

Ventilation System Information Available at Penn State

- ❖ Inlets for mechanical ventilation systems in animal housing. Wheeler, E. F. 1997. Factsheet G-91. 8 pp.
- ❖ Selecting rated ventilation fans. Wheeler, E. F. 1996. Factsheet G-85. 6pp.
- ❖ Selecting tunnel ventilation fans. Wheeler, E. F. 2002. Factsheet G-103. 4pp.
- ❖ Ventilating greenhouse barns – guidelines for livestock production. Wheeler, E. F. 2000. Factsheet G-102. 4 pp.
- ❖ Self-adjusting baffle inlet to improve air distribution. McFarland, D. F. and Wheeler, E. F. 1998. Factsheet G-92. 8 pp.
- ❖ Ventilation improvements for veal calf housing using 50-calf room example. Wheeler, E. F. and McFarland, D. F. 1998. Factsheet G-93. 8 pp.
- ❖ Make your own ceiling inlet air speed monitors. Wheeler, E. F. and Martin, J. 1998. Factsheet G-94. 3 pp.
- ❖ Ammonia monitoring in animal environments using simple instruments. Wheeler, E. F. 2009. Factsheet G-110. 2 pp.
- ❖ Psychrometric chart use. Wheeler, E. F. 1996. Factsheet G-83. 5 pp.
- ❖ Natural ventilation for dairy tie stall barns. Graves, R. E. 1995. Factsheet G-74. 4 pp.
- ❖ Ridge opening for naturally ventilated dairy shelters. McFarland, Graves, Tyson, Wilson. 2007. Idea plan DIP 811. 5 pp.
- ❖ Natural ventilation for freestall barns. Graves, R. E. and Brugger, M. 1995. Factsheet G-75. 6 pp.
- ❖ Horse Stable Ventilation. Wheeler, E. F. 2003, Publication UB039. 6 pp.
- ❖ Tunnel ventilation for tie stall dairy barns. Tyson, J.T., McFarland, D. F., and Graves, R. E., 2014. Factsheet G-78. 14 pp.

A single printed copy of free college publications is available as requested by an individual, group, or business within Pennsylvania.

To order printed copies of free publications, or for assistance with pricing, contact:

Publications Distribution Center
College of Agricultural Sciences
The Pennsylvania State University
112 Agricultural Administration Building
University Park, PA 16802-2602
Phone: 877-345-0691
E-mail: AgPubsDist@psu.edu



Additional Ventilation Resources

[Evaluating air quality in livestock housing environments.](#)

Eileen Fabian-Wheeler 2012. Hand-held instruments and their use in ventilation system performance evaluation. Air Quality Education in Animal Agriculture, eXtension. 14 pp.

[Odor measurement for animal agriculture.](#) Eileen Fabian-Wheeler, Mike Hile, David Schmidt. 2012. Background on sense of smell, odorants and techniques to properly monitor odor. Air Quality Education in Animal Agriculture, eXtension. 20 pp.

[Environmental Control for Confinement Livestock Housing.](#)

AE-96. 1980. Dated but still useful on-line overview of mechanical ventilation systems for animal housing. Don Jones, William Friday and Sherwood DeForest. Purdue University.

[Mechanical Ventilation Design Worksheet for Swine Housing.](#)

1999. Jay Harmon. Simple evaluations for selecting proper ventilation system components. Iowa State University. 12 pp.

[Natural Ventilation for Livestock Housing.](#)

AE-97. 1980. Basics of wind and buoyancy ventilation systems in an on-line summary. Don Jones, William Friday and Sherwood DeForest. Purdue University.

[Natural Ventilation for Freestall Dairy Barns.](#)

442-763. 2009. Susan Wood Gay. On-line overview of air exchange and control of open sided facilities with additional resources provided. Virginia Tech.

[Ventilation and Cooling Systems for Animal Housing.](#)

A3784-6. 2004. Scott Sanford. Brief introduction to box fans, high volume low speed fans, thermostats, sprinkler systems, and variable speed fans. University of Wisconsin. 3 pp.

[Ventilation for Warm Confinement Livestock Buildings.](#)

1993. Joseph Zulovich. Brief introduction to fans, inlets and their controls with insulation and air flow requirements. On-line and hardcopy. University of Missouri.

[Dairy Ventilation.](#) Scott Sanford. On-line resource for energy performance of mechanical ventilation and circulation fans with links to other resources. University of Wisconsin.

[Agricultural Ventilation Fans: Performance and](#)

[Efficiencies.](#) An on-line source of unbiased fan performance data for use by designers of agricultural ventilation systems. BioEnvironmental Systems Lab (BESS). University of Illinois.

[Livestock Housing Ventilation: Natural Ventilation Design and Management for Dairy Housing.](#)

2006. Terry Mescher and Michael Veenhuizen. Good on-line summary. Ohio State University.

[Choosing Fans for Livestock and Poultry Ventilation.](#)

2009. Jay Harmon and Hongwei Xin. Includes basic principles of fan quality, rating, performance and installation for typical and special applications. Iowa State University. 4 pp.

[Animal Housing-Elimination of Pit Ventilation](#)

[Overview.](#) 2014. Jay Harmon, Steven Hoff and Angela Rieck-Hinz. Short fact sheet outlines the case to reduce gas emissions while providing suitable air quality in the building. Iowa State University 2 pp.

[Energy Efficient Fans for Poultry Production.](#)

PM 2089H. 2010. Dana Petersen. Similar publication also available for swine production, PM 2089E. Iowa State University. 2 pp.

[Sizing Minimum Ventilation to Save Heating Energy in Swine Housing.](#)

PM 2089J. 2010. Jay Harmon, Mark Hanna and Dana Petersen. Proper sizing and use of variable speed fans can reduce wasteful energy use due to over-ventilation. Iowa State University. 2 pp.

[Supplemental Ventilation Systems for Modified, Open-front Swine Buildings.](#)

PM 1761. 1998. Dan Meyer and Jay Harmon. Figures and description on how to modify open-front buildings for better ventilation. Iowa State University. 4 pp.

[Troubleshooting Natural Ventilation Systems- Livestock Industry Facilities and Environment.](#)

PM 1659. 2006. Jay Harmon and Steven Hoff. Using just a few simple tools to better understand performance of ventilation. Iowa State University. 2 pp.

[Ventilation Systems for Sheep Barns- Sheep](#)

[Management.](#) PM 0989 15. 1988. Dan Morrical. Basics of natural and mechanical systems for alleviating poor ventilation and associated lamb health problems. Iowa State University. 2 pp.



Mechanical Ventilation Systems for Livestock Housing. MWPS-32. 72 pp. 1990. Approx. \$12. Applications and examples are provided for beef, dairy, calves, horses, poultry, rabbits, sheep, and swine.
Source: MidWest Plan Service (MWPS)

Natural Ventilating Systems for Livestock Housing. MWPS-33. 32 pp. 1989. Approx. \$5. Provides guidelines for applying ventilation basics to achieve naturally ventilated farm and livestock buildings.
Source: MidWest Plan Service (MWPS)

Heating, Cooling and Tempering Air for Livestock Housing. MWPS-34. 48 pp. 1998. Approx. \$7. Discusses the implications of combining ventilating systems with supplemental heating and cooling systems in farm and livestock buildings.
Source: MidWest Plan Service (MWPS)

Poultry Environment Problems A guide to solutions. Nottingham University Press. 88 pp. 2002. Approx. \$32. Provides information on the needs and responses of poultry to aspects of the climatic environment.
Source: www.annexbookstore.com

Natural Ventilation for Dairy Tie Stall Barns. DPC 6; NRAES 119. 7 pp. 1998. Approx. \$8. Robert Graves, Robert Milne and John Porter. Detail of components for good ventilation performance.
Source: Dairy Practices Council. www.dairypc.org



Reference Books Linking Agricultural Engineering and Animal Sciences

Livestock Energetics and Thermal Environmental Management

James A. DeShazer, editor
ASABE Publisher
2009 hardcover. 220 pp.
Approx. \$69.
www.asabe.org

Agricultural Building and Structures

James A. Lindley, James H. Whitaker
ASABE Publisher
1997 hardcover. 636 pp.
Approx. \$50.

An Introduction to Environmental Biophysics

Gaylon S. Campbell
Heidelberg Science Library
2013 softcover. 160 pp.
Approx. \$64.

Environment Control for Animals and Plants

Louis D. Albright
ASAE Publisher
1991 hardcover. 453 pp.
Approx. \$70.

Principles of Animal Environment

Merle L. Esmay
AVI Publishing Company, Westport, Connecticut
1983 hardcover. 358 pp.
Approx. \$5-\$50 used.

Ventilation of Agricultural Structures

Mylo A. Hellickson, John N. Walker
ASAE Publisher
1983 hardcover. 372 pp.
Approx. \$60-\$150 used

Some titles list specific sources. Otherwise, local bookstores may order titles for you or try these on-line book sellers:

- Amazon www.amazon.com
- Barnes & Noble Booksellers
www.barnesandnoble.com
- Alibris www.alibris.com

MWPS
122 Davidson Hall
Iowa University
Ames IA 50011
www.mwpsHQ.org

This is not an exhaustive list of book suppliers. Mention of trademark, proprietary product, or vendor is for information purpose only. No endorsement is implied.

Contact Information

Department of Agricultural and Biological Engineering
249 Agricultural Engineering Building
University Park, PA 16802
814-865-7685
www.abe.psu.edu

Penn State College of Agricultural Sciences research and extension programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Extension is implied.

This publication is available in alternative media on request.

The University is committed to equal access to programs, facilities, admission, and employment for all persons. It is the policy of the University to maintain an environment free of harassment and free of discrimination against any person because of age, race, color, ancestry, national origin, religion, creed, service in the uniformed services (as defined in state and federal law), veteran status, sex, sexual orientation, marital or family status, pregnancy, pregnancy-related conditions, physical or mental disability, gender, perceived gender, gender identity, genetic information or political ideas. Discriminatory conduct and harassment, as well as sexual misconduct and relationship violence, violates the dignity of individuals, impedes the realization of the University's educational mission, and will not be tolerated. Direct all inquiries regarding the nondiscrimination policy to Dr. Kenneth Lehrman III, Vice Provost for Affirmative Action, Affirmative Action Office, The Pennsylvania State University, 328 Boucke Building, University Park, PA 16802-5901, email: kfl2@psu.edu, phone: 814-863-0471