



RELATIVE HUMIDITY AND POULTRY HOUSE VENTILATION

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Many times, when the conditions of ambient air in the poultry house (or anywhere else for that matter) are discussed, they are described in terms of their temperature and relative humidity. Temperature is generally well understood, as a thermometer measures dry bulb conditions and provides current ambient readings in degrees Fahrenheit. On the other hand, relative humidity, especially in combination with changing temperature, can be more difficult to comprehend.

First let's define some terms. "Relative" humidity, which is expressed as a percentage, indicates the ratio of water vapor (moisture) suspended in the air to the quantity of water vapor in the air at saturation (at the same temperature). Saturation, of course, represents 100 percent relative humidity.

Understanding the relationship between temperature and relative humidity is also important. As the dry bulb temperature of air increases, its ability to hold moisture also drastically increases. For example, the moisture holding capacity of air approximately doubles for each 20 degree F increase in dry bulb temperature.

I will return to the significance of this phenomenon when discussing ventilating poultry houses in a moment, but first let's define a few more terms.

On occasion, the term absolute humidity is used, which refers to the actual quantity of water vapor present in the air. This quantity is normally expressed as grains or pounds of vapor present per unit

(generally pound) of dry air. Wet bulb or saturation temperature, which has already been mentioned, is the temperature of the air when it is totally saturated with moisture or at 100 percent relative humidity. Another term, which is often confused with wet bulb or saturation temperature, is dew point temperature. The dew point is the temperature at which moisture will begin to condense out of the air, and because of the energy required to convert vapor back to water, it is always a lower temperature than at saturation. People that have a deeper interest in the relationship between moisture and temperature of air (known as psychrometrics) should refer to a psychrometric chart which further illustrates these associations.

Now back to these relationships and how an understanding of them can aid in the ventilation of poultry houses.

The biggest challenge during colder weather is that of removing moisture. With the knowledge that increasing the temperature of air increases its moisture holding capacity, producers can heat colder air and remove moisture. For example, a producer can bring in cold, damp (high relative humidity) air, heat it, and by doing so, reduce its relative humidity.

Then the air with reduced relative humidity has the ability to "absorb" moisture from the litter and manure, and in conjunction with exhaust fans, remove it from the poultry house. When realizing the moisture holding capacity of air essentially doubles with each 20 degree F increase in temperature, a producer can then bring air into a house at 30 degree F and 100 percent relative humidity, heat it until 70 degree F is reached and significantly increase its ability to hold moisture. In this case the relative humidity would be reduced from 100 percent to 25 percent. Air

at this relative humidity has a tremendous ability to absorb and remove moisture from the poultry house.

Another application of these relationships is used during warmer months in conjunction with evaporative cooling. First let's explain that energy is required to convert water moisture to a vapor.

As an example, 8747 BTUs are required to evaporate one gallon of water. For example, 8747 BTUs of cooling occurs when one gallon of water is converted from a liquid to a vapor. However, for this process to work, the air has to have the ability to absorb or hold additional water in the form of vapor. This brings us back to relative humidity. For if air temperature (dry bulb) is 95 degree F and the relative humidity is 45 percent (relative humidity in Pennsylvania is almost never above 50 percent when ambient temperature is 95 degree F or above), the air has the ability to hold additional moisture.

Therefore, if the water vapor in the air is increased by 50 percent (from 45 percent to 67.5 percent relative humidity), the air would be cooled by approximately 10 degree F. (Remember for each 20 degree F increase in temperature the moisture holding capacity of air is doubled.) This concept is used in most broiler, broiler breeder, and many turkey houses when using foggers and fogger pads, and evaporative cooling pads during the warmer months.

Producers by in large know that warming outside air during the colder months allows it to hold more moisture, and that in the summer evaporative cooling provides relief from the heat. However, the belief is that if producers have a clearer understanding of the concepts supporting these practices, they will be better able to first operate and then fine tune their houses during both the hot and cold times of the year.

MAILBOX MARKET FOR SALE

Shop stove wood or coal, with regulator \$150. Wanted-PTO hammermill. David Hoover, 888 Five-pointville Rd, Stevens, PA 17578. Lanc. Co.

Model 791 modernmatic, 70 Case farm egg packer, no Sunday calls. Washington Co. 301-842-3543.

New Idea corn picker, narrow row \$3800. 24x24' Butler grain bin, no floor, no fans \$1600. After 7 p.m. Bucks Co. 215-249-9151.

Seed rye, stalk shredder, 2 row NI. Manure spreader NI 12A. Cattle feeder, Patz 60'. Rims tires off 320JD. Harford Co. 410-692-5048.

25MI Holdem electric fence, wire roll, insulators, etc. \$50 all. Metal tree trunk guards \$.50 each. Hewn chestnut barn beams. Carroll Co. 410-374-6877.

Small bucket a day stove with tank \$45. Also estate heatrola coal stove \$25. Gideon Stoltzfus, 202 Snake Hill Rd, Bird In Hand, PA 17505. Lanc. Co.

9 month old Hereford bull, purebred, no papers, \$5. Red Angus cow and calf heifer rebred for March 1996 \$1300. York Co. 717-259-7626.

Bake furnace for spray booth, 970,000 BTU excellent shape, used little, 5 years old, sells new \$11000, \$3500 OBO. Martinsburg, WV. 304-263-7554.

Knitting RK900 knitting machine, some extras, like new, table and some yarn included. \$500. Franklin Co. 717-532-7341.

1992 Cushman truckster dump body, 1 ton electric hoist, police bar lights, grain auger, Hollymatic pat-tie mach, stacker slicer. Bucks Co. 215-257-7678.

Male pygmy goat, very active \$75. Two gas tanks with hand pumps 150 and 200 gal, \$50 each. Chester Co. 610-857-9676.

One seated mennonite carriage, 5 years old, good condition, on rubber. Lanc. Co. 717-354-2772.

Pony cart, rubber wheels, 32", used only few times \$650. 1 cart with pole, nice condition \$425. Lanc. Co. 717-336-7273.

Earth rite C fertilizer 3-2-2-7 \$205 a ton. Call in evenings. Lanc. Co. 717-442-9013.

IH TD6 62 series w/blade, PTO 6 cyl engine, home comfort wood/coal, 6 plate cook stove, white w/ water tank. Adams Co. 717-528-4914.

Galloway 1 3/4 hp restored on truck, Webster mag, repainted, running shape \$1200. Lebanon Co. 717-273-9554.

Little Giant corn drag, good condition \$400 OBO. Howe 6x5' 50 ton capacity scale, with blue point \$800 OBO. Lebanon Co. 717-272-5089.

2 ac+ farmette with 3 br log house, small, steam, some timber, fire wood, good land, Farmall Super C tractor. Snyder Co. 539-8518.

Peruvian Paso mare, 15h black, 8 yrs, smooth to ride, great temperament, asking \$3500. Willing to negotiate with knowledgeable person. Branchville, NJ. 201-948-5383.

Rye for cover crop combine run \$3.75 bushel. Bulk discount, leave message, will return call. Somerset Co. 908-359-5517.

Oliver, 2 row corn picker, #3 shed kept, field ready \$200, call after 6 p.m. Lanc. Co. 717-336-6949.

NI 279 cutdioner, good condition \$1800. Dauphin Co. 717-865-5474.

Used 24x40 double wide home, new windows, new kitchen, \$15000 OBO. 3 bedroom. Centre Co. 814-355-7489.

Tennessee walkers, exc trail and field trail, several to choose from, 100% sound. Cold Springs Farm. After 5 p.m. Wapwallopen, PA. 717-379-3217.

Horse beef or dairy farm 88 acres, 56 tillable, 4 barn complex, 5 bedroom home, stocked farm pond. Ontario Co. 716-394-8239.

No 10 International 16 disc grain drill, very good condition, grain fertilizer, and grass seed boxes, ready to go. Berks Co. 610-678-3027.

Troy-Bilt chipper, shredder, fits your horse tiller, PTO, A1 shape, call for good price, after 4 p.m. Berks Co. 610-562-0528.

Garage doors, steel insulated, with all hardware included, excellent condition, 10x10' \$300 each. Schuylkill Co. 717-366-2404.

Trac vac lawn vacuum tow model b&s, quantum engine, 48 gal, receptacle, used 1 season, perf cond, \$450. Camden Co. 609-567-5583.

Free-2 br Great Lakes mobile home with 11x26' addition and furniture. Also 1977 Road Runner factory t-tops, \$1200. Montgomery Co. 610-631-1890.

600 series Ford forklift, 6000 lb capacity, steel wheels, excel condition \$3500. Also step up transmission \$250. Lanc. Co. 7170442-9489.

German violin, full size with bow, exc cond, \$300 Living room set, sofa, recliner, love seat, lamps, end tables, \$300. Balto Co. 410-256-1168.

1980 DM Mack tri-axle, with dumpster roll off hoist, inside/outside rails, 300 engine, 7 speed transmission, price \$14000. Lackawanna Co. 717-842-6464.

Mack equipment 300 engine, 5 speed transmission, rear tandem cutoffs. Neway tag axle, rolloff frame inside/outside, radiators. Lacka Co. 717-842-6464.

New Idea 5109 9ft haybine, good condition \$3750. White 324 3 bottom 14" plow, \$500. New points, colters. Rockingham Co. 540-879-9870.

Team of Belgain mares, very gentle and safe, great for inexperienced, also ornate parade harnesses and horse equipment. Blair Co. 814-793-3410.

Tools lathes, 15" cole chester loaded, jewels powermatic delta saws, 12" jointer, air shaper, planters, 20" band saw sanders, disk belt. Montgomery Co. 301-384-5376.

Fence posts, 3"x7" steel pipe \$3 each. Lumber 2x3" and 2x4" \$.50 each. Montgomery Co. 215-234-8971.

Clean sheep fleeces for hand spinning, other crafts. Many colors, white, grey, brown. Also wool yarns and blankets. Dauphin Co. 717-362-4315.

1990 Ford extended cab, dually pickup, auto 460 asking \$7500 OBO. After dark. Chenango Co. 607-639-2293.

1974 6 horse van, GMC CB radio, no C DL, swap 2-4 horse tractor, good shape, aluminum box, intercom, water tank, must see. \$13000 OBO. Delaware Co. 610-566-1332.

Oliver 70 row crop SN 222868, good condition overall. 1938 \$1050 OBO. Cumberland Co. 609-327-5185.

Player piano 1924 story and clank birch, weed completely rebuilt refinished, and electrified, excellent condition, plays great \$1250. Carbon Co. 610-377-2965.

1989 F250 XLT Lariat, supercab, 4x4, 460 gas, 67000 \$15500 OBO. 1974 GMC 6 horse van, gas No CDL, good shape \$13000 OBO. Possible swap. Delaware Co. 610-566-1332.

Farmall 504 tractor \$3000. NH 271 baler \$1500. NH 469 haybine \$1200. IH MF grain drill \$600. Somerset Co. 609-466-0553.

JD #14T baler, field ready \$425. Zimmerman tetter, like new \$1100 OBO. Two old milk cans \$15 each. Dauphin Co. 717-545-7580.

Wooden pallets and broken boards, some 2x4 hardwood, and some cutoffs for firewood Wanted 48x48 pallets. Berks Co. 610-670-9642

NH 770 harvester w 2m head \$1850. JD 716 IH 110 Dion 3 beater wagons \$850 each. All neg Blair Co. 814-944-0818.

Buck wood stove, blower, \$350. Harford Co. 410-676-2359.

New Generac 3500XL Genset, 3.5 KW, 29.2 amps, 6.5 hp, OHV gas engine, auto idle, wheel kit, 2 yr warranty \$725. Lanc. Co. 610-286-7093.

NI 323 picker \$1950. Farmec bin wagon \$750. Brilliant 10ft packer, Int fast hitch, post hole digger. Berks Co. 610-562-4464.

6HP lister generator, 104 amps, 12.5 kw, set of steel wheels, wanted for L35 NH skidloader. Lanc. Co. 717-354-6310.

4 year old bay saddlebred carriage horse, traffic safe, sound, 16.9 h, Amos Hoover, 682 Reidenbach Road, New Holland, PA 17557 Lanc. Co.

Int 1 1/2 hp engine, mode LA, pre 64 mod 70 win 30-06 with scope. Union Co. 717-523-0352.

1934 Plymouth tractor, only 232 made. AC model B with elec start, and foot brakes. After 4 p.m. Warren Co. 908-475-3330.

12x55 holiday mobile home, about 1970 2 bedroom, hot water heat, very good condition, ready to move \$750. Call evenings. Lehigh Co. 610-285-2611.

8hp riding mower, Briggs and Stratton engine 30" cut, with rear bagger, \$200. Schuylkill Co. 717-345-8180.

157 acre dairy farm, 44 tie stall barn, 3 silo. Union Co. 717-524-2031.

Ford 3 speed c/d standard trans, 1986, pedals, linkage, bell housing, sno co tilt bed, utility trailer, 13" rubber, winch on front. Cecil Co. 410-398-7680.

Cub Lobo #154 wide front live PTO, turf tires, new with bully mower, kept inside \$2950. MF rear weights for MF combines 5 of weights cultcase \$15. More. Dauphin Co. 717-852-5412.

Belt driven 4000 watt generator, 120 or 240 volts, 16 amps, 32 amps. Lanc. Co. 717-442-3218.

Gehl 72FC chopper \$800. Allied auger 741, \$500. Wooden haywagon \$300. Daffin Mill, 12" roller mill \$700. Lebanon Co. 717-867-1400.

Mirafount hog waterer, 2 holes with lids, \$225. 138 Pennsy Rd, New Providence, PA 17560. Lanc. Co.

Acclimated horses and mules, 2 week trial. Henry Fisher, 331 Stauffer Rd, Lititz, PA 17543. Lanc. Co.

1978 GMC 18' midwest dump body, 427 motor air brake \$10500. 410 John Deere backhoe \$12000. Wyoming Co. 717-833-4115.

Little Giant corn drag, Tyler PTO fertilizer spreader, NH 795 manure spreader, with top beater, hydraulic end gate. Lanc. Co. 717-464-2398.

One Hampshire service age boar, also hay and straw, large or small lots. York Co. 717-757-6062.

1969 Ford F250 HD 4x4 for parts, good engine and running gear, price \$600 OBO. Northampton Co. 610-266-6075.

Auger cart, JD #68 works well, not rusted out, new paint \$700. Berkeley Co. 304-274-3412.

14 hole modern ag hog feeders, finishing ex cond, \$250 each. Lebanon Co. 717-866-7863.

New Ford 110, 3ph 2 bottom plow, \$525. New Ford 205 3ph, 7' disc harrow \$650 or \$1100/both. Augusta Co. 540-886-3157.

357 New Holland grinder mixer, fair condition \$1850. Lanc. Co. 717-354-6829.

Nice white silky chicks, various sizes, also grown roosters, Cadet 127 hydro with 48" mower. Berks Co. 610-683-7902.

John Deere A, 1947, good shape, good paint. After 6 p.m. Cumberland Co. 717-776-7088.

1985 Apple II C computer, color monitor, imagewriter II color printer, extra ribbons, lots of software, manuals for everything, asking \$400. Lebanon Co. 717-866-5215.

Apples red and yellow delicious stayman winsap, also juice apples. Hillside Orchards, 1765 Jug Rd, Dover, PA 17315. York Co. 717-292-4886.

Two antique corn shellers, good condition, both for \$225. Also accordion, 120 bass, good condition \$175. Berks Co. 610-693-5624.

85 Jeep Cherokee, 4x4 2dr, newly rebuilt 2.8l engine, many new parts, new tires, \$4200 After 5 Columbia Co. 717-387-0555.

Sofa, floral design \$55. Dauphin Co. 717-944-9021.

Animal Housing Expo Nov. 8-9

LEBANON (Lebanon Co.) — The 1995 Animal Housing Expo will be held Nov. 8-9 here at the Lebanon Fairgrounds.

"The purpose of the expo is to help farmers in the Northeast learn more about animal housing concerns," said Dan McFarland, general chair of the expo and Penn State Cooperative Extension Agent in York County.

Approximately 1,400 people attended last year's event to learn more about animal comfort, animal handling, building and remodeling animal housing facilities, stall design and maintenance, ventilation, fly control, financing, milking systems and more.

At this year's Expo, presentations by nationally known and local expert and producers, plus numerous demonstrations and displays will focus on a variety of topics related to animal housing and care. Wisconsin veterinarian Gordon Jones will discuss "A Vet's Commonsense Perspective of Cow Comfort."

"Paying Attention to Swine Pro-

duction Details" will be the focus of a veterinarian-producer panel. Tim Royer of Timber Tech Engineering will talk about "Avoiding Building Failures."

Attorney Gary Heim of Mette, Evans and Woodside will team up with Liz Brown, a tax consultant and preparer, to focus on the topic, "Your Business — Will It Continue On Into The Future?" The question, "Do You Have Sufficient Coverage?" will be addressed by Doug Wallick, Agway Insurance.

Approximately 40 commercial exhibits will afford farmers an opportunity to see new products and concepts and to make contacts with people who can provide them with the products and services they need. Admission is free. Food is available and drawings will be made for door prizes.

The event is sponsored by Penn State Cooperative Extension in conjunction with local agribusinesses. For more information, contact your local cooperative extension office.