

CALVING EASE

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Sam Leadley, Attica Veterinary Associates

Needed: Good Air (Part 1: Goals and Measurement)

Summary: Calves need good quality air if they are going to be healthy. Ventilation management is essential to achieve this goal. Part 1 this month is about: (1) setting air quality goals, and (2) comparing air quality to these goals. Part 2 next month will be about managing the housing to achieve “good air” as economically as possible.

The role of ventilation management in providing good air

In addition to good nutrition, water and a clean, dry, and comfortable place to rest calves need good quality air. Regardless of the type of housing used quality of air can depend on the location of the calves. Where a choice is available it's preferable to find locations that are up wind of older heifers and cows. Further, calf housing several hundred yards from cow and heifer barns takes advantage of dispersion of contaminants regardless of wind direction. Our goal is clean fresh air.

Calf hutches or outdoor pens compared to barns have an advantage in providing access to good quality air. However, many calf enterprises have chosen barns for housing. Operator comfort and convenience of calf access are often cited as major advantages.

One huge change when moving from outdoor housing to barns is the responsibility for ventilation. The calf care person is now in charge of providing “good air.” We should keep in mind, “Problems arise when the ventilation system is managed based on human needs and not that of the calf. Remember, calves are in the barn 24/7 and the caretaker only a comparatively small proportion of time.” (Gooch, 2007)

For those of us located in cold climates providing “good air” in barns is especially challenging because compared to higher warm weather air exchange rates, winter-time lower airflow rates:

- (1) Dilute dust, bacteria, viruses and noxious gases much more slowly, and
- (2) Do a poorer job of removing moisture (about 0.22 lbs. of moisture are released per hour for every 100 pounds of body weight).

Setting air quality goals

We know that diseases spread through the air. Airborne viruses and bacteria can be passed from infected animals to healthy ones. Low air exchange rates favor high concentrations of pathogens. Also, when there are many small airborne water droplets pathogens hitchhike rides from sick animals to others in the same air space. Noxious gases, especially ammonia, reduce the effectiveness of the natural defense mechanisms designed to keep bacteria and viruses out of calves' lungs

Let's say we set three air quality goals: (1) little or no ammonia odor in the barn, (2) the relative humidity inside the barn is no more than 10 % higher than outside, and (3) the air temperature inside the barn is no more than 10°F warmer than outside.

Measuring air quality – what to do

You can assess ammonia odors by placing your nose at the same level above the bedding as a calf's nose would be when in a lying position. It helps to do this right away upon entering the barn since your sensitivity to ammonia gas drops fairly quickly on exposure.

If in doubt about whether or not there is an ammonia odor have a non-farm friend make the "sniff test" for you. Remember that the test is done at calf nose location, not standing in the middle of the feed alley.

More exact measurement can be done with a toxic gas detector. I've seen them for sale on E-Bay for less than US\$100. My more expensive instrument draws air in through a single-use glass tube and reads directly in parts per million (ppm) of ammonia.

I use a digital read-out meter that cost about \$170 that measures both relative humidity and temperature. It takes about 15 minutes to reach a stable reading. Our local hardware store sells instruments ranging from \$10 to \$30. All of these are easy to read directly in percent relative humidity. Any inexpensive thermometer will work to estimate temperature.

Caution! It is best if these relative humidity measurement instruments are not left in a calf barn any longer than the time it takes to get valid measurements. Experienced persons tell us that dust will accumulate in and on instruments left in the barn. The dust can make the relative humidity readings inaccurate.

References: Gooch, Curt "Role of Facility Design and Ventilation on Calf Health." Proceedings of the Professional Dairy Calf and Heifer Conference, March 20-23, 2007, Burlington VT, pp135-146. And, "Cold Weather Ventilation and Humidity Management for Improved Respiratory Health" American Veal Association Technical Bulletin.

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