

UNL's Livestock Environmental Issues Committee Includes representation from UNL, Nebraska Department of Environmental Quality, Natural Resources Conservation Service, Natural Resources Districts, Center for Rural Affairs, Nebraska Cattlemen, USDA Ag Research Services, and Nebraska Pork Producers Association.

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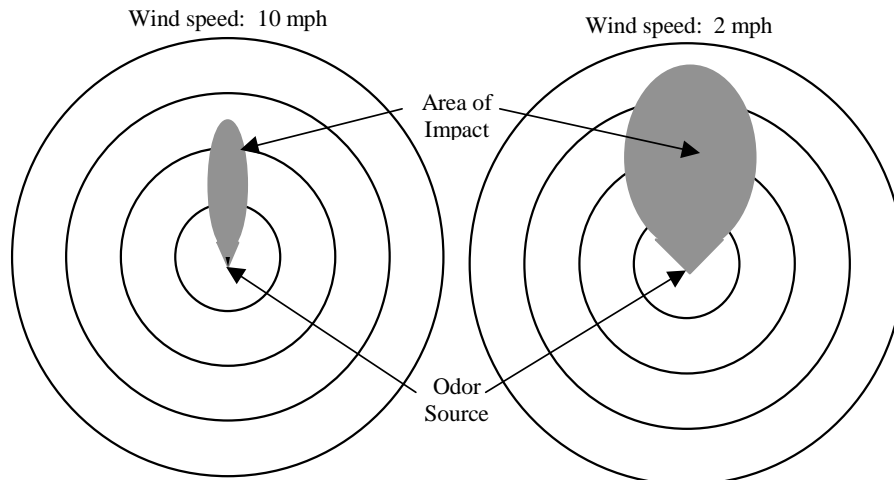
Using Nebraska Wind Data For Assessing Odor Risk

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Knowledge of local wind characteristics can be important in siting of new livestock and poultry facilities and scheduling activities that produce odor. Producers and advisors can access wind data summaries for 28 Nebraska location through the Manure Matters web site sponsored by the University of Nebraska (<http://www.ianr.unl.edu/manure>).

A neighbor's judgement as to when an odor is a nuisance is based upon four considerations. They include the 1) Frequency, 2) Intensity, 3) Duration, and 4) Offensiveness of an odor (often referred to as the FIDO). Two of these key components (frequency and duration) are influenced by the wind characteristics of an individual site. Odors travel the same direction as air movement and disperse laterally very little except at very low wind speeds (see Figure 1). Understanding the wind characteristics for a proposed or existing livestock or poultry facility is critical to minimizing the odor nuisance experienced by neighbors.

Figure 1. Relative size of an odor plume when all conditions are the same except wind speed. Low wind speeds allow lateral dispersion of odors and produce larger impacted areas.



Odor complaints associated with livestock housing and manure storage are most common during the summer (warm weather encourages odor production and release). Odor complaints are also common when manure storage are agitated, manure is land applied, and when lagoons turn over (early spring). The attached wind information sheet provides a Wind Characteristics summary specific to the area around Ainsworth, Nebraska for these times of year. Similar summaries have been developed for 27 other Nebraska sites based upon wind data from 1993 through 1999.

Prevailing wind information can be used for several key decisions relative to siting of a new facility or selecting a preferred land application site:

- 1. Neighbors who will need greater buffer distances.** The prevailing winds for Ainsworth suggest that greater buffer distances should be allowed for neighbors to the north and northwest (prevailing wind out of the south and south-southeast) of an odor source to minimize the impact. Smaller setback distances are needed to the east and west of an odor source due to the low incidence of winds from these directions. If spring related odors are of concern from a proposed site (e.g. lagoon prone to spring turn over), then a large buffer distance to the south and southwest would be desirable.
- 2. Facility or land application site direction from neighbors.** If flexibility exists in location of the facility or the selection of an application site, alternative sites to the east and west should be considered. The prevailing winds suggest that neighbors located north to northwest and south to southeast of the facility or application site are most likely to be exposed to an odor plume. Alternative sites to the east and west might be explored for their ability to move neighbors out of the path of these prevailing winds and limit their frequency of odor exposure.

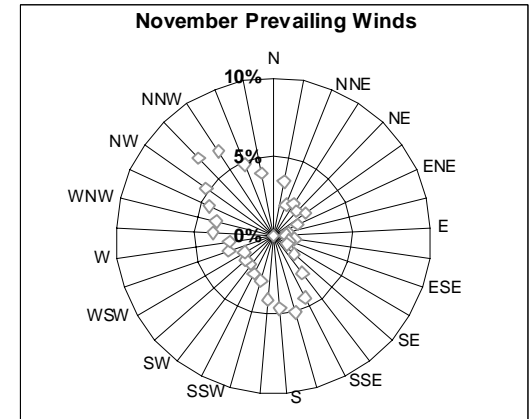
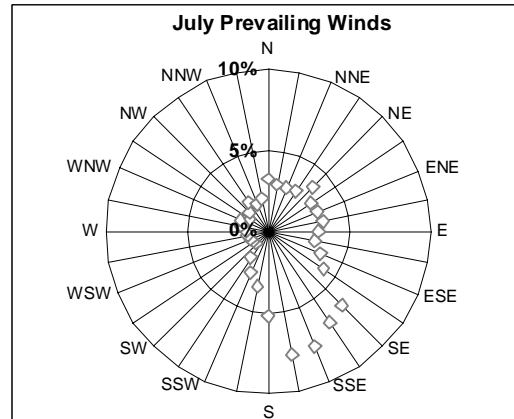
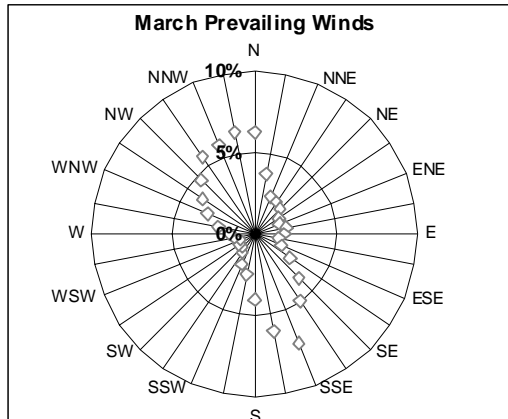
Many odor complaints also result from land application of manure during periods of low wind speeds. The wind summary sheet provides an indication of average wind speeds vs. time of day and the frequency with which wind blows at speeds less than 5 mile per hour. As suggested by Figure 1, low wind speeds result in a larger odor plume and greater neighbor impact. For Ainsworth, there is a 50% chance (180 days per year) that winds will be less than 5 mph at 6 am. Low wind speed is least common between 9 AM and 6 PM. Land application between 8 AM and 4 PM (allows time for odors to dissipate before lower wind speeds occur) typically has the lowest risk of impacting neighbors. Monitoring of daily weather forecast and actual conditions will better define this ideal time of day for land application.

Knowledge of wind characteristics for a proposed livestock facility is critical to understanding the potential risk associated with odor. Prevailing wind information can be extremely useful for selecting "low odor risk" animal housing, manure storage, and land application sites. Knowledge of common periods of higher wind speeds can also be useful in scheduling activities that create odors such as land application or storage agitation. This web accessible wind summaries for Nebraska should be used to assist in these decisions.

To access the Nebraska Wind Data Website: www.ianr.unl.edu/manure/wind/wind.html

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Wind Characteristics for Ainsworth, NE (7-year Average)



Above: Markers indicate percent of total time in a month that wind blew in the specified direction.
Left: Numbers indicate percent of total time in a month that wind blew in the specified direction.
Below: Number of days out of 365 that wind blows less than five mph at the specified time.
Bottom-Left: Average wind speed at specified time of day.

Prevailing Winds for All Months

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Ave
N	4.2%	4.5%	6.3%	6.0%	4.6%	3.0%	3.2%	3.2%	4.1%	4.1%	3.5%	3.6%	4.2%
NNE	2.6%	2.2%	2.5%	3.9%	3.3%	2.8%	2.9%	3.2%	3.1%	2.9%	2.4%	1.8%	2.8%
NE	1.6%	1.8%	2.2%	3.8%	3.9%	3.8%	3.9%	3.7%	3.4%	3.6%	2.5%	1.5%	3.0%
ENE	0.9%	1.1%	1.6%	2.0%	2.4%	2.5%	3.2%	2.5%	2.1%	1.7%	1.0%	1.0%	1.8%
E	1.2%	1.1%	1.8%	2.8%	1.9%	2.5%	3.1%	2.7%	1.5%	1.6%	1.4%	1.2%	1.9%
ESE	1.2%	1.5%	1.8%	2.3%	2.2%	2.6%	3.5%	2.4%	1.5%	2.0%	1.0%	1.4%	1.9%
SE	2.4%	3.8%	3.9%	3.1%	4.0%	5.5%	6.4%	4.5%	4.2%	3.2%	3.0%	2.3%	3.8%
SSE	5.0%	5.4%	7.2%	5.0%	7.8%	9.1%	7.6%	10.3%	8.1%	5.9%	5.0%	3.8%	6.7%
S	4.5%	4.3%	4.0%	3.0%	5.0%	4.6%	5.2%	7.2%	6.7%	3.9%	4.0%	4.0%	4.7%
SSW	2.5%	2.5%	2.0%	1.8%	2.8%	2.0%	2.7%	2.5%	2.8%	2.5%	2.7%	2.4%	2.4%
SW	1.6%	1.2%	1.1%	1.4%	0.9%	1.1%	1.1%	1.4%	1.3%	1.4%	2.3%	2.4%	1.4%
WSW	2.1%	2.0%	0.9%	1.4%	0.9%	1.3%	1.2%	0.7%	1.0%	2.2%	3.0%	2.3%	1.6%
W	2.9%	2.1%	1.6%	1.8%	1.0%	1.5%	1.4%	1.1%	1.5%	1.9%	3.8%	3.6%	2.0%
WNW	4.7%	4.1%	3.1%	2.3%	1.4%	1.6%	1.9%	1.8%	2.3%	3.2%	4.5%	5.9%	3.1%
NW	8.4%	7.2%	4.7%	5.5%	4.2%	3.1%	1.7%	1.6%	3.8%	7.4%	6.8%	8.9%	5.3%
NNW	6.0%	5.5%	5.9%	5.6%	4.0%	3.2%	1.8%	2.0%	3.3%	4.0%	4.9%	5.0%	4.3%

Average Wind Speed(mph)

3:00 AM	6.4	6.3	7.1	7.3	7.1	6.7	5.6	4.9	5.4	5.8	6.0	6.4	6.3
9:00 AM	6.9	7.6	9.2	11.6	11.1	10.0	8.6	8.3	9.3	9.2	7.8	7.3	8.9
3:00 PM	10.4	12.1	12.3	13.2	12.3	11.4	9.6	9.5	10.4	11.7	11.7	11.2	11.3
9:00 PM	5.8	6.7	7.9	8.0	8.2	7.9	6.7	6.2	6.6	6.2	6.2	6.1	6.9
	7.3	8.2	9.1	9.9	9.6	8.9	7.6	7.1	7.6	8.0	7.7	7.5	8.2

