AGENDA
Municipal Services Committee
September 28, 2020
7:00 P.M. – Council Chambers

1. **Call to Order & Roll Call**
2. **Establishment of Quorum**
3. **Old Business**
4. **New Business**
   a. **Ordinance** – Approval to amend Title VII of the Darien City Code, "Health and Sanitation".

   b. Minutes – **July 20, 2020** Municipal Services Committee
5. **Director's Report**
6. **Next scheduled meeting** – Monday, October 26, 2020
7. **Adjournment**

AGENDA MEMO
Municipal Services Committee
September 28, 2020

ISSUE STATEMENT
Approval of an ordinance amending Title VII of the Darien City Code, "Health and Sanitation"

BACKGROUND/HISTORY-AUGUST 17, 2020
An increasing number of residents want to raise chickens and bees in urban environments as a hobby or they may believe this method of raising chickens for food may be safer or less expensive. Darien currently does not regulate the keeping of chickens and bees on residential property, but it is subject to general nuisance rules. Recent calls to the city, asking if raising chickens or bees is permitted, prompted the City Council to consider an ordinance developed specifically to regulate raising chickens or bees. Preliminary research shows public health and nuisance concerns related to backyard chicken and bee keeping can be managed through proper regulations and education of owners. Residential chicken ordinances typically address such items as number of chickens allowed per property, prohibiting roosters, permitting process, location and size of chicken coop on property, registration and sanitary condition requirements.

~~*Attachment A*~~ *is a compiled spreadsheet from various municipalities regarding regulations on chicken raising and beekeeping. The goal is to create a balanced City ordinance for each and would consist of the following:*

Definitions-	*Hen-female chicken; domestic fowl raised for egg producing* *Beekeeping-An apiary is a location where beehives of honey bees are kept. Apiaries come in many sizes and can be rural or urban depending on the honey production operation.*
Quantities-	*City Council to determine quantities* *Chickens-Limit to 6* *Apiaries-Limit to 2 Units*

Additional regulations will be presented to the Committee for consideration and will include the following:

Grandfathering of Existing/Amortization
Permit through Registration-Right to Access Property
Setbacks
Structures
Prohibited Uses - Home Based Business-Prohibited
Sanitation
Violations - Penalties/Fees

BACKGROUND/HISTORY- SEPTEMBER 28, 2020 - UPDATE FOR COMMITTEE
At the August 17, 2020, City Council Meeting, Staff was directed to present an ordinance in regards to chicken and bee keeping for the Municipal Services Committee. Two residents spoke on the subject; one who owns and maintains an existing chicken coop and the second resident lives adjacent to a resident who fosters chickens. The resident adjacent to a property with chicken raising further suggested that screening should be required along with daily housekeeping of the chicken coop.

To date Staff has completed the following:

- Updated the matrix of various municipalities regarding the fostering of chickens and bees, attached and labeled as **Attachment A**, (2 pages).
- Met with two residents that currently foster chickens.
- Spoke with two residents that are adjacent to one chicken fosterer. Both residents commented on privacy screening requirements.
- Updated the correspondences received from residents and non-residents regarding chicken and bee fostering, attached and labeled as **Attachment B**, (156 pages).
- Researched municipal ordinances for a City model ordinance.

Attached and labeled as **Attachment C**, (3 pages) is a proposed model ordinance regarding the fostering of chickens and bees. Staff will present each item within the proposed ordinance for consideration or modification. In conjunction with the proposed ordinance a handout sheet will be implemented as part of the registration/permit process and is attached and labeled as **Attachment D**. (4 pages)

Attached and labeled as **Attachment E**, is the pamphlet form of the Ordinance, pending any modifications.

STAFF RECOMMENDATION

Staff is recommending the following consideration from the Municipal Services Committee:

1. Approval of the proposed ordinance-pending any modifications the item will be presented to the City Council for approval at the October 5, 2020 meeting.

   OR

2. Prohibit the fostering of chickens and/or bees-Discussion-Compliance date

ALTERNATE CONSIDERATION

As directed by the Municipal Services Committee

DECISION MODE

This item will be placed on the October 5, 2020 City Council Meeting for formal consideration.

Municipal Chicken Regulations Comparative Table

	Bolingbrook	Carol Stream	Darien, WI	Downers Grove	DuPage County	Minneapolis, MN	Warrenville	West Chicago	Westmont	Willowbrook	Wood Dale	Woodridge	DRAFT 1 Darien
Permit/Licenses	not allowed	not specified	yes w/ non refundable $15 fee	yes-$99-5 yrs.-only after all building permits obtained-proof structure complies-only to single family homes	8/18/20 consideration of text amendment-unknown but could be require conditional use approval	yes; one year renewable fowl permit - 3 tiers-tier 1-6 hens; tier 2-7-15 hens; tier 3-16-30 hens		not allowed	required-one time permit & review fee	not allowed	not allowed	not allowed	required-one time permit & review fee
Applications			yes see above	submit to Community Development Director		yes			not specified				yes
Responsible Officer			code enforcement-complaints	not specified		Community Planning & Economic Development			not specified	police regulated/animal control		police regulated/animal control	Community Development/Municipal Services
State Registration			compliance with State regulation	not specified		not specified			not specified				compliance with State regulation
Inspections				not specified		may inspect if deemed necessary			city				initial inspection for compliance and inspect if deemed necessary
Roosters			prohibited	prohibited	not permitted	yes; with permit	no		prohibited				prohibited
# Chickens			4 hens	4 hens	4 hens	see permit/licenses	10		6 hens				8
Sale of Eggs			not specified	not specified		prohibited-only commercial use; has different requirements			not specified				prohibited
Enclosures			coop shall be elevated 2ft above ground;	required-entirely confined at all times	30ft setback	yes; screened from habitable buildings on neighboring property; constructed of durable materials & compatible with your house & neighboring residential properties	confined at all time (coop or run)		one per property; cannot exceed 7ft in height				yes; screened from habitable buildings on neighboring property; constructed of durable materials & compatible with your house & neighboring residential properties
Space per hen			not specified	50'-no permit 7'-permit		10 sq. ft. for each fowl housed in outside run			5ft per hen not to exceed 50ft				15 x 15 or 225 square feet
Sanitation			cleaned daily-waste disposed of properly	property must be kept clean sanitary-clean once every 24 hrs.-refuse disposed of in clean/sanitary fashion		chicken litter should be removed frequently to prevent odors from emitting over property lines-can be double bagged & thrown away or composted on-site; may not be placed in recycling	see rodent protection		not allowed to become unkempt or unclean; swept at least once in 24 hrs.				property must be kept clean sanitary-clean once every 24 hrs.-refuse disposed of in clean/sanitary fashion
Rodent Protection			food must be stored in vermin proof container	feed shall be kept in rodent-proof containers		not specified	chicken feed kept in rodent proof container		enclosure to be impenetrable against rodents				enclosure to be impenetrable against rodents
Nuisance Clause			1st offense-warning; 2nd-$50; 3rd-12 months revocation & $200 fine	not specified		any coop 3 or more occurrences in 12 months to receive complaints of noise, odor or any other complaint that are founded			not specified				1st offense-warning; 2nd-$50; 3rd-12 months revocation & $200 fine
Humane Conditions			no raising of chickens for fighting	outlined		provide adequate safeguards to protect the fowl							provide adequate safeguards to protect the fowl
Slaughtering Restrictions			prohibited	prohibited		prohibited			prohibited				prohibited
Lot Size			unknown	unknown	unknown	not specified	10,000 sq. ft. lot		not applicable				all single family residential
Zoning					permitted under conditional use	not specified							administrrative
Location of Enclosures			rear yard only fence required	any structure within 50'of any property line-permit must be obtained	behind front wall of house	rear yard 20 ft. away from residential neighbor	rear yard only		rear yard only; 10ft from dwelling; 20ft from rear & side of yard				rear yard 20 ft. away from residential neighbor-fence required
Penalties/Fines			nuisance-animal cruelty-failure to obtain permit	not specified		may refuse to grant permit if failure to comply with criteria & has the right to keep any fees paid by the applicant			2 violations in 1 year requires removal of hen coop; 3 total violation require removal of the hen coop				2 violations in 1 year requires removal of hen coop; 3 total violation require removal of the hen coop

Municipal Honey Bee Regulations Comparative Table

	Bolingbrook	Carol Stream	Darien, WI	Downers Grove	DuPage County	Minneapolis, MN	Warrenville	West Chicago	Westmont	Willowbrook	Wood Dale	Woodridge	DRAFT Darien
Allowed	yes	no	not specified	not specified	only on agricultural land	yes	yes	not specified	yes	not specified	no regulations prohibiting as long as it does not become a nuisance.	not specified	YES
Permit/Licenses	not required					required-fee initial year-no fee annual renewal-if revoked/refused fee will be retained	not required		required				required-one time permit & review fee
Applications						required $100 fee							Community Development/Municipal Services
Responsible Officer	no enforcement												compliance with State regulation
State Registration	not specified						yes		registered with state				compliance with State regulation
Inspections						as deemed necessary	colonies must be inspectable						initial inspection for compliance and inspect if deemed necessary
# Colonies						1/2 acre or smaller -2 colonies; larger than 1/2 acre smaller than 3/4 acre-4 colonies; larger than 3/4 acres smaller than 1 acre-6 colonies;1 acres but smaller than 5 acres-8 colonies; larger than 5 acres-MACC determines as appropriate	no more than 4 for 1st 20,000 sq. ft. - 2 colonies for each additional 10,000 sq. ft.		no more than 2 colonies per 1/3 acre of property				2
Sale of honey	limited					not specified	home occupation regulations		not specified		retail sales by home based businesses are premitted entirely by mail/telephone/internet or appointment only		prohibited
Enclosures						removable frames-painted-good condition-if less than 25' from property line flyway barrier. maintain at least 6' high 10' either direction of hive	if landing boards face property line must maintain a flyway barrier		no closer than 15ft from any lot line				yes; screened from habitable buildings on neighboring property; constructed of durable materials & compatible with your house & neighboring residential properties
Space for Hive						see # colonies	minimum 20,000 sq. ft.						hive shall not be larger 5ft in height
Sanitation							removable combs kept in sound, usable sanitary condition		regularly cleaned & emptied water source should be located by hive				property must be kept clean well maintained -source of water available at all times on property during hive's active months (Mar-Nov) humane conditions to be maintained year round
Nuisance Clause						not specified					no regulations prohibiting as long as it does not become a nuisance.		prominent signage warning of the presence of bees shall be required on the property
Lot Size						see # colonies	minimum 20,000 sq. ft.		see # of colonies				1st offense-warning; 2nd-$50; 3rd-12 months revocation & $200 fine
Zoning									shall not occur on multi-family property				administrative
Location of Enclosures						see # colonies	10ft from all property line-may not be located on side, corner or front yards		rear yard of residential; roof or rear yard of commercial				rear yard 15 ft. away from residential neighbor-fence required
Penalties/Fines													

MEMO

PUBLIC COMMENTS - BEEKEEPING & CHICKENS

RESIDENT	NON-RESIDENT	UNKNOWN			
2			no opinion on chickens	2	
4	1		pro-chickens no specification	5	
4		1	pro-chickens w/regulation	5	
2			pro-chicken w/no regulation	2	
12		1	opposed to chickens	13	
8	1		w/regulations	9	
					36
12	1	1	no opinion on bee keeping	14	
4	1		specification	5	
3			pro-beekeeping w/regulation	3	
			regulation	0	
8		1	opposed to beekeeping	9	
4			w/regulations	4	
					35

From: Lynnie Ley
To: Regina Kokkinis
Subject: Chickens and bees
Date: Thursday, August 6, 2020 3:32:00 PM

I do not have chickens or bees, but it has been something I've been interested in for years! I think it would be great if Darien allowed such hobbies. And good for the Earth if honeybees were allowed.

From: mcam9905[redacted]
To: Regina Kokkinis
Subject: Ordinance
Date: Thursday, August 6, 2020 5:21:09 PM

Hello
DuPage county has an ordinance about chickens. Plus more chickens means more coyotes which can present all sorts of problem. Plus if not properly cared for chickens can carry all sorts of viruses. So yea everyone's so worried about covid yet they promote livestock in residential areas. As far as bees, I know in school the peanut allergy people ran the show. Well there are so many more people allergic to bees and again if not properly cared for can cause all sorts of problems with residents living close by. Also raw honey can cause botulism which can be fatal. Remember eggs are like $1.50 and honey is like 3 bucks. Let's not risk other people's health for simple non necessities.
Thank you

Sent from my iPhone

From: Steve Leopoldo
To: Regina Kokkinis
Subject: Chickens
Date: Friday, August 7, 2020 2:23:13 PM

Hello,

We have had chickens for a while within Incorporated Darien.

I'm happy to help answer any questions.

[redacted]

Best,
Steve

From: Luanne Spiros
To: Regina Kokkinis
Subject: Darien Beekeeping
Date: Friday, August 7, 2020 5:39:02 PM

Hi Regina

My name is Luanne Spiros and i am a resident of Darien. The reason for my email is to respond to the query regarding beekeeping in Darien.

I am recommending that bees be ALLOWED in Darien -- as they are in many progressive communities (e.g., Wheaton, Naperville)-- with the appropriate restrictions in place (e.g., max # hives). Just like chickens and dogs, appropriate code for the welfare and benefit of the community and the animals is required.

Background: I am currently a beekeeper -- but my bees are not located in Darien-- and i am a Master Beekeeper student with Cornell University.
I am also a Forest Preserve of DuPage County volunteer beekeeper/STEM/interpreter. My plan is to have bees in Darien but i have none now.

Honeybees are critical to our ecosystem . 2/3 of all of our fruits and vegetables are the result of pollinators and Honeybees pollinate 80% of these plants. Further they enrich our communities by enhancing our gardens rich with blooms and providing food for our critical creatures (e.g., birds). When we expand native plantings (Darien Parks, Nantucket Basin) honeybees are a critical and synergistic part to our community.

As a beekeeper and Cornell University Master Beekeeper student i can help you (or Dan or others) if you have any questions about beekeeping. I'd be happy to provide science-based information to help you during this process. LMK.

Thank you for asking! Luanne Spiros

From:	Heather Conroy
To:	Regina Kokkinis
Cc:	Paul Jacob Conroy
Subject:	In response to Chicken Keeping in Darien
Date:	Saturday, August 8, 2020 11:53:48 AM

Hello Regina,

I am a Darien resident since 2016. I belong to the Darien Rotary Club as well as the Darien Woman's Club, as well as hold committee positions on both. I am also an Executive Board member, second year, on the Darien Woman's Club.

I currently have 5 chickens and run a 580 member group specifically for Backyard Chickens with many local area and Darien members. Which if you or others want to join, we would love to have you see what chicken keeping is all about.

https://www.facebook.com/groups/1811019362460926/?ref=share

I would like to ask if any ordinances with chickens is going to be required, even though we are respectful adults, then a committee be formed with community members that own chickens, that would like to work up the ordinances that will now govern what they are doing, from people that actually do it and understand chickens. The owners would be the best committee for it. I would love to be a community member on the committee.

Thank you,

Heather Conroy

From: Thomas Belczak
To: Adventure Awaits mom
Cc: Regina Kokkinis; Dan Gombac
Subject: Re: Chicken owner again
Date: Saturday, August 8, 2020 12:11:14 PM

Melissa Goodrich:

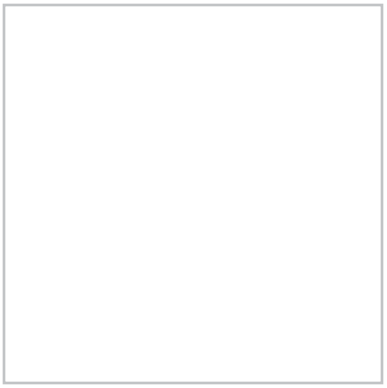
I so sorry for your loss, I was unaware. Please accept my sympathies. This chicken issue was brought to my attention by both your neighbors and yourself, and there will be a resolution that both sides will need to live with. To be clear, we will not eliminating chickens (and/or bees). We will create an ordinance that allows chicken-owners and their neighbors to peacefully co-exist. Most municipalities, that allow chickens, have regulations and rules regarding the number, and necessary care for the raising of chickens. We have regulations regarding dogs & cats, and chickens should be no different.
I am hoping to get input from the neighborhood regarding this issue. Please review the ordinances that Downers Grove, Illinois & Darien, Wisconsin as an example of how other municipalities allow & regulate the ownership of chickens. I am no more in favor of eliminating chicken ownership, as I would be in allowing unlimited and unregulated ownership. We are looking to create an ordinance that protects the chicken owner without impairing their neighbors ability to enjoy the use of their own property. Please advise as to your opinion as to how chickens should be allowed and regulated in a residential neighborhood. I am sure there are some people that consider chickens "farm animals" with no place in our community, but I am equally sure that there are people that think chicken ownership is a safe and wonderful hobby. Our ultimate goal will be to meet in the middle. Please encourage your friends to email me with their opinions on this issue, as well as emailing Regina Kokkinis @ rkokkinis@darienil.gov. I've attached the latest city posting that was in this weeks direct connect. If you haven't signed up for Darien's Direct Connect, I suggest that you do, as it provides a weekly synopsis of what's happening in Darien. You can sign up at darien.il.us

Thomas Belczak
Alderman Ward 7
7025 Beechnut Lane
Darien, Illinois
630-418-2046.

City Considers Ordinance on Chickens and Beekeeping

In response to increased resident interest in raising chickens and beekeeping in Darien, the City is gathering information and considering an ordinance to specifically regulate raising chickens and bees. The City does not currently have an ordinance that addresses urban chickens or beekeeping, but these activities are subject to general nuisance rules. The City recognizes the interest in raising birds and bees for food and/or as a hobby. Our preliminary research shows that proper regulation (e.g. number of animals, prohibiting roosters, sanitary requirements) and education can help residents enjoy these hobbies without disturbing their neighbors.

If you currently have chickens or beehives on your property, please let us know as we are trying to determine the number of residents



impacted by a new ordinance. Please also send any feedback or questions on this topic to Regina Kokkinis at rkokkinis@darienil.gov.

On Aug 8, 2020, at 10:21 AM, Adventure Awaits mom <melissagoodridge91@[redacted]> wrote:

Good morning sir,

I saw the article about my chickens this morning. This brings me great sadness that you are trying to create legislation to eliminate chickens in our beautiful community. I got rid of my rooster immediately after your notice. I have 6 hens now. My family has been hit hard with covid. The chickens provide is essential food, just like our garden. They also provide essential learning and life skills for my young children who are homeschooled. I'm not sure if we have personally met, but I'd love to talk more and meet in person. I know this neighborhood talks so I'm sure you heard of the family who lost their baby to a tragic accident last summer ... thats us! Our beautiful baby Layla passed away. Ever since we have tried to find outlets to our grieving and mental health. The chickens bring great joy to our family and the last thing my young sons need is more loss. So please stop pursuing to hurt my family and let's all just live and let live. I'm not hurting anyone.

Thank you for understanding,

Your neighbors Melissa and family

Regina Kokkinis

From: Dan Gombac
Sent: Wednesday, September 9, 2020 4:18 PM
To: Regina Kokkinis
Subject: FW: In favor of backyard chicken owning

fyi

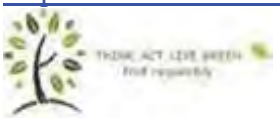
Daniel Gombac
Director of Municipal Services
630-353-8106
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: Joe Marchese <jmarchese@darienil.gov>
Sent: Wednesday, September 9, 2020 3:11 PM
To: Dan Gombac <dgombac@darienil.gov>; Tom Belczak <tbelczak@darienil.gov>; Eric Gustafson <egustafson@darienil.gov>; Joseph Kenny <jkenny@darienil.gov>
Subject: FW: In favor of backyard chicken owning

Joseph A. Marchese

Mayor, City of Darien
630-353-8108
Celebrating "50" Years!

To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
http://www.darien.il.us/Reference-Desk/DirectConnect.aspx



From: Adventure Awaits mom <melissagoodridge91@gmail.com>
Sent: Wednesday, September 9, 2020 2:21 PM
To: Joe Marchese <jmarchese@darienil.gov>
Subject: In favor of backyard chicken owning

Good afternoon,

I'm writing to inform you that I am in favor of backyard chicken owning in darien IL.

Darien resident,

Melissa Goodridge

From: lgb110@[redacted]
To: Regina Kokkinis
Subject: Chickens and Bee Keeping Ordinance
Date: Saturday, August 8, 2020 3:03:34 PM

I do not want raising chickens and bees in backyards to be allowed in Darien. No exceptions to this rule. This hobby should only be allowed in rural areas where there are large backyards or a distance between property lots. I am totally against allowing this. We live in a townhome with very small backyards. Please take into consideration the large number of townhomes and condominiums in our community if this Ordinance is allowed.

Thank you,

Jim and Linda Banich
8517 Evergreen Lane

From: Tamara Fredriksen
To: Regina Kokkinis
Subject: Chicken/Bee Ordinance
Date: Saturday, August 8, 2020 6:38:51 PM

Dear Ms. Kokkinis,

I understand that the city of Darien is considering a new ordinance regarding chickens and bees. My family and I have been residents (67th & Western) since the fall of 2013.
We do not currently have chickens or bees, but have been considering them for the past several years. We have three young children and I feel that raising chickens and possibly bees could be a wonderful learning experience for them, in addition to additional food sources (fresh eggs & honey).
One of our neighbors (only 2 doors down) has several chickens and if my husband hadn't been invited over to see them, we would have no idea they are there (no noise, smells, disturbances of any kind).
I believe that an ordinance could be helpful in that it can give residents clear information on what is/is not allowed regarding animal keeping within our city. That said, I believe it is important to ensure that the guidelines are not so narrow that they make it difficult for most residents to keep these animals if they so wish.
As a side note, you may also want to reconsider our city's stance on domestic animals as well. I know that currently we are allowed up to three animals (dogs/cats), but I think it would be beneficial to allow up to four. We currently have two cats (we got them at the same time as kittens) and when the time comes would like to get 2 more kittens together so they have a playmate their own age.
Thank you for your time and consideration.

Sincerely,
Tamara Fredriksen

Sent from my iPhone

From: christopher Maka
To: Regina Kokkinis
Subject: Honey bees
Date: Monday, August 10, 2020 10:31:43 AM

Good morning,

First and foremost I think this should clearly state HONEYBEES, not bees. Bees have a reputation to be pests. Honey bees are endangered pollinators that we absolutely need in the world. I think regulating is a great idea. However, the fine people complaining should be required to read up and enlighten themselves a bit before having a say on a matter they clearly don't know very much about.
I have honey bees on my property. Thank you.

Sent from my iPhone

From: ELISABETH MONAHAN
To: Regina Kokkinis
Subject: DARIEN BACKYARD CHICKENS
Date: Monday, August 10, 2020 10:49:12 AM

Good Morning and Happy Monday-

I am writing to express my opinions on backyard chicken keeping and beekeeping- One of the reasons I moved to Darien was because there were not regulations against keeping backyard chickens.
My family and I bought 6 hens this spring to raise as pets. I would be devastated if Darien would regulate against my pets or request that I reduce the amount of hens I have.

ROOSTERS: Personally, I do not think roosters should be allowed due to the volume and frequency of their crows. My understanding is the current stand in Darien on chickens is if they are not loud they are ok, basically saying if you have a rooster you are going to get in trouble and need to rehome the rooster. That being said, chickens do not have external genitalia, and even professionals are accurate only about 80-90% of the time. That means you can pay extra to have the hatchery send you only girls, but still end up with a boy on accident. Often you do not know for sure if you have a boy until it crows at about 3-4 months old. Now comes the process to rehome which can take a few days to a few weeks at the most. So even if Darien passes an ordinance saying ONLY HENS.... you will still have the rare rooster crowing for a week or two before it is rehomed. And I would not be surprised if a few of those owners request to keep them because they have been attached to them for months. A simple no and reference to noise ordinance should be sufficient to speed along the rehoming process.

NUMBER OF HENS: Hens are small animals, the size of 6 chickens combined easily only equals one dog. Most towns that initially started with allowing 4 hens are moving up to allowing 6 hens. The size of a coop/run for 4 hens and for 6 hens is the virtually the same.

LIVING CONDITIONS: Most owners take care to have safe, clean and odor free coop/runs for their pets. As with any pet owner, some are not good at that upkeep. Those isolated incidents should be investigated after complaints received, just as you would with dogs or other pets kept in the backyard that are being neglected.

BEEKEEPING: This is on my bucket list of things to do in my future backyard. Unfortunately, I live next to a school so I will not attempt my hand at beekeeping until I move.

So, in summary, I think the current allowance of pet chickens as long as you don't get a noise/ odor complaint should remain. Even if you regulate chickens to just a few hens, you will still have the occasional complaint call about accidental rooster and the occasional neglectful pet owner call.

Please keep me informed of the status of this ordinance review.
Thank you.

Elisabeth Monahan
1938 Manning Road
Darien IL 60561

[redacted]

From: Elisabeth Monahan
To: Regina Kokkinis
Subject: Re: DARIEN BACKYARD CHICKENS
Date: Monday, August 10, 2020 11:00:39 AM

Attaching some pics from my yard.


TRY
FRESH

On Aug 10, 2020, at 10:49 AM, ELISABETH MONAHAN <lizzy.monahan@[redacted]> wrote:

Good Morning and Happy Monday-

I am writing to express my opinions on backyard chicken keeping and beekeeping-
One of the reasons I moved to Darien was because there were not regulations against keeping backyard chickens.
My family and I bought 6 hens this spring to raise as pets. I would be devastated if Darien would regulate against my pets or request that I reduce the amount of hens I have.

ROOSTERS: Personally, I do not think roosters should be allowed due to the volume and frequency of their crows. My understanding is the current stand in Darien on chickens is if they are not loud they are ok, basically saying if you have a rooster you are going to get in trouble and need to rehome the rooster. That being said, chickens do not have external genitalia, and even professionals are accurate only about 80-90% of the time. That means you can pay extra to have the hatchery send you only girls, but still end up with a boy on accident. Often you do not know for sure if you have a boy until it crows at about 3-4 months old. Now comes the process to rehome which can

take a few days to a few weeks at the most. So even if Darien passes an ordinance saying ONLY HENS.... you will still have the rare rooster crowing for a week or two before it is rehomed. And I would not be surprised if a few of those owners request to keep them because they have been attached to them for months. A simple no and reference to noise ordinance should be sufficient to speed along the rehoming process.

NUMBER OF HENS: Hens are small animals, the size of 6 chickens combined easily only equals one dog. Most towns that initially started with allowing 4 hens are moving up to allowing 6 hens. The size of a coop/run for 4 hens and for 6 hens is the virtually the same.

LIVING CONDITIONS: Most owners take care to have safe, clean and odor free coop/runs for their pets. As with any pet owner, some are not good at that upkeep. Those isolated incidents should be investigated after complaints received, just as you would with dogs or other pets kept in the backyard that are being neglected.

BEEKEEPING: This is on my bucket list of things to do in my future backyard. Unfortunately, I live next to a school so I will not attempt my hand at beekeeping until I move.

So, in summary, I think the current allowance of pet chickens as long as you don't get a noise/ odor complaint should remain. Even if you regulate chickens to just a few hens, you will still have the occasional complaint call about accidental rooster and the occasional neglectful pet owner call.

Please keep me informed of the status of this ordinance review.
Thank you.

Elisabeth Monahan
1938 Manning Road
Darien IL 60561

[redacted]

From: Sue Schemmer
To: Regina Kokkinis
Subject: Chickens and bees
Date: Tuesday, August 11, 2020 6:04:57 PM

I think people should be able to have chickens and bees on their private property in Darien. I have neither but bees are beneficial to us all and raising chickens is a great hobby.

I can understand not liking roosters but the owner of the chickens got rid of the rooster.

Some people complaining about the bees probably do not know the difference between honey bees and yellow jackets. All over the Midwest, we are seeing an increase of yellow jackets this year probably due to the weather. Honey bees are harmless if not harassed.

Sue Schemmer

From: James Freidag
To: Regina Kokkinis
Subject: Chicken ordinance
Date: Wednesday, August 12, 2020 9:04:27 PM

I'm writing to have you consider A few concerns when you create an ordinance

I am writing in confidence as we live next door to Melissa and Jim Harvatt Our home is 1009 ironwood Ave. Their backyard is our side yard I do not want to cause trouble. They are nice people.
My cell is [redacted] if you want to call to ask specific questions. When you look at our home - your eyes are drawn to their stuff in their yard including a big coop- the outside playhouse for the chickens when they are out of the cage

This year we have had an unbelievable amount of flies. We had to put up fly traps. We can't eat outside without flies bothering us. (more so than any of the 37 years we have lived here)

I wish there was some ordinance for keeping the cage clean and proper disposal of the " waste" to prevent flies and odor They did get rid of their rooster which was crowing early am. But they have 6 chickens. (It's not a country sized lot- the coop is near our house). If they had the coop under their deck it wouldn't be such a problem and look neater. Or a privacy fence along the lot line

The chickens are let out of their cage and allowed to roam. That itself doesn't bother me -if they stayed in their own yard. (it could be prevented with solid fencing). They have a coop but get the chickens out to wander and eat bugs etc. and occasionally clean the cage by putting another layer of straw). (the chickens don't know where the property line is). If you drive on ironwood you will see what I mean

I would suggest a limit of No more than 4 female chickens allowed. Unless you have an acre or more of land. Without limits they could Raise 50 If they wanted

Please drive by to see for yourself. Look at other ordinances. Please require a privacy fence. Require cleaning to prevent rodents- flies- bugs and to reduce the smells.

I would prefer for you to see this for yourself verses having us brought up. Her side neighbor Karen is also upset as her bedroom window is near her yard and a chicken laying an egg can be as loud as a rooster !
Address SMELL CLEANLINESS. # allowed. FENCING Roaming chickens not fenced in.

If you look at who signed the ordinance you will see most names are NOT in Darien.
Marie
Sent from my iPhone

From:	Jim Freidag
To:	Regina Kokkinis
Cc:	Tom Belczak; Marie Freidag
Subject:	Chickens in Darien.
Date:	Thursday, August 13, 2020 12:32:57 PM

Chickens and other outdoor animals need to be regulated. We are directly influenced by the ugly coop on Seminole. I am sure others in Darien are negatively impacted also.
1. This coop is 20' from our house and 30' from our driveway. The first thing we see turning into our driveway is this coop.
2. The resale of our house is and will be directly affected by this structure. Probably 10 to 50 thousand.
3. FLIES! We have lived on Ironwood for 36 years and never until this summer have we had massive amounts of flies in and around our house. To the point we keep a fly seater out at all times, we have had to hang fly strips in the house(great decoration when company comes over), and I have had to put fly traps outside on our deck so it is tolerable when we are outside. I can show you how many flies are in a trap in just 4 to 5 days. Gross.
4. SMELL! We use our deck and outside backyard extensively. Now, we have gone inside a couple of times because the odor was bad. We eat on our deck a lot. We have chose to reduce outdoor dining.
5. Noise. Though the Rooster is gone, have you heard hens laying eggs? We no longer enjoy having our windows open at night while sleeping. Between the clucking and smell.

Coop and chickens need to be regulated.
1. A permit should be required (Fee)
2. A maximum number of hens (4)
3. An annual veterinary check should be required (it is for dogs and cats)
4. Coops (cages) should be required To be cleaned on a daily basis.
5. Chickens (non-domestic) animals should be required to be in a cage 24/7.
6. An 8 foot solid fence that blocks views of the coop from neighbors yards should be required.
7. Coops (cages) should be required to be at least 10? from property lines and have same to similar building code requirements as a shed in Darien.

Thank you for allowing me to express my opinion.

Sent from my iPhone
Jim Freidag
[redacted]

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Chicken ordinance OR Ban chickens in Darien
Date: Wednesday, September 9, 2020 8:06:24 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Marie Freidag <mariepchef@[redacted]>
Date: 9/5/20 6:40 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Re: Chicken ordinance OR Ban chickens in Darien

We are out of town for the weekend. Thank you for stopping by. Will be home by Monday night. I'm glad you could see for yourself. I appreciate that so much. My cell is 630-712-7645

Sent from my iPhone

> On Sep 5, 2020, at 4:42 PM, Joseph Kenny <jkenny@darienil.gov> wrote:
>
> Marie,
> I stopped by your home this afand rang the bell.
>
>
>
> Joe Kenny
> Darien Alderman Ward 3
> 1605 Holly Ave
> Darien, IL 60561
> (630)334-2858.
>
>
> Sent from my Sprint Samsung Galaxy Note9.
>
>
>
> -------- Original message --------
> From: Marie Freidag <mariepchef@[redacted]
> Date: 9/5/20 2:16 PM (GMT-06:00)
> To: Joseph Kenny <jkenny@darienil.gov>
> Subject: Re: Chicken ordinance OR Ban chickens in Darien
>
> Thank you Joe. I'm very upset by the thought of 8 chickens. The only other suburb that allows that is Naperville A min 30' set back from lot line. 6' barrier along the lot line AND 6' landscaping of the coop at 75% is required in Naperville!!!!
>
> It's obvious to me that probably the Chicken so called expert- heather conboy wrote this ordinance so that our neighbor could have her postage size back yard of 20x30 and a huge coop and that She could keep all of her chickens and get 2 more!! PLEASE. Visit our property 1009 Ironwood Ave to look for yourself.
>
> Also PLEASE LOOK INTO the kinds of illnesses can be transmitted from residential chickens. Right now Melissa is keeping her yard cleaner than I've ever seen. I'm very alarmed at what could happen when 8 neglected chickens live on top of us.
>
> My suggestion is either to ban chicken altogether or LIMIT TO NO MORE than 4.
> The fee of 25 will not cover Darien INSPECTING. Those coops. If anything it should be a 25 fee plus a 25 per chicken fee or 125 for 4
>
> Please promise us that you will drive by our home. You are welcome to go on our back deck and see how close our table is to the coop as well. Thank you
>
> Sent from my iPhone
>
>> On Sep 5, 2020, at 11:07 AM, Joseph Kenny <jkenny@darienil.gov> wrote:
>>
>> Marie,
>>
>> I have received your email as well as a handful of other Darien residents. I will use all of the feedback provided to make an informed decision when it's time for the City Council to vote on an ordinance.
>>

>> Sincerely,
>>
>>
>> Joe Kenny
>> Darien Alderman Ward 3
>> 1605 Holly Ave
>> Darien, IL 60561
>> (630)334-2858.
>>
>>
>> Sent from my Sprint Samsung Galaxy Note9.
>>
>>
>>
>> -------- Original message --------
>> From: Marie Freidag <mariepchef@[redacted]>
>> Date: 9/4/20 3:16 PM (GMT-06:00)
>> To: jmarhese@darienil.gov
>> Subject: Chicken ordinance OR Ban chickens in Darien
>>
>> To whom it may concern.
>> Chicken Ordinance
>> Darien “was” a nice place to live for 37 years.
>> I am hoping that Darien will either consider banning chickens altogether or create an ordinance that values the rights of residences who border a property where a chicken coop is harbored. A proper ordinance is called for so that property values will not decrease and public health will not be compromised. A proper ordinance is necessary for a suburban community where houses are near to each other. Darien is not a farm community.
>> Communities that surround Darien either ban chickens or restrict the # of chickens to under 4 hens. In addition other communities regulate fencing, cleanliness of coops, size and look of coops, disposal of “waste”, how close they can be to neighbors, registration of animals , permits, liability insurance, and many require that adjoining neighbors sign off and agree to the chicken coop. In Burr Ridge you must have a minimum of an acre lot and can only have 4 chickens, In Downers Grove you need the permission of 100% of your neighbors and can only have 4. Chickens are banned in Woodridge, Hinsdale, Elmhurst, Lombard, Lisle, Clarendon Hills, Oak Brook, and Willowbrook.
>> Our neighbors who rent their home, put up a large coop in their backyard which is our side yard and front yard. They have recently added an “addition” onto their coop without getting a permit. They currently have 6 chickens. There is NO fence of any kind between the coop and our house and our outdoor deck. The chickens are allowed to roam outside their pen and wander onto our property, the sidewalk and they have been as far as 3 houses down from theirs. At a minimum we ask that a property that has a coop must have privacy fencing at least 6’ in height. That would work to allow the animals to stay on their own property as well as preserve the integrity of the homes nearby. In addition there needs to be regulations of daily cleaning and disposing of the “waste” chickens create. A limitation to the size of the coop and that the coop must be aesthetically pleasing. IF someone fails to abide by the rules then there must be some repercussions and fines for not abiding by them.
>> I know that their corner lot- like many in Hinsbrook subdivision of Darien have the unusual property of the back yard- being a neighbor’s side yard. In Hinsbrook most corner lots have put up a privacy fence- not because of chickens but so that they can enjoy their back yard without being on top of their neighbors. As you can imagine- having a chicken coop makes that arrangement even more awkward.
>> You need a permit to build a shed. There should be a permit needed to build a coop. There needs to be a limit of coop size and how close it can be to a neighbor’s property line.
>> Looking at Western Springs as an example of an ordinance- Roosters are banned and they are allowed up to 4 hens. Chickens are not allowed to roam. The chickens must be in a fenced yard. There are regulations on how the shelter should look and how close it should be to the property line and there is a fee. Prior to putting in a shelter – the owner has to submit plans – and have required inspections.
>> In researching chicken ordinances of other suburbs – there is not one that I found that would allow a configuration such as the coop that currently exists next to our property.
>> IF Darien does not ban chickens- and IF Chickens are allowed- I would ask that they be
>> * limited to 4 hens and ban roosters.
>> * require a privacy fence that is a minimum of 6’
>> *That the owners of the chickens carry liability insurance specifically covering their chickens.
>> *That inspections must take place and that the City of Darien have the means to inspect and license chickens and revoke them if non- compliance is found.
>> *That there be a licensing fee and permit required
>> * That the coop must be cleaned daily, and that all the waste be disposed of in a metal container with a lid.
>> *That the food be stored in a metal container with a lid
>> *That steps are taken to avoid infestation of rodents, flies, and illnesses associated with chickens.
>> *And that failure to abide by these rules would require the owners to get rid of the chickens and coop.
>>
>> I am saddened at having to appeal to you. As a 37 year resident of Darien. As a 30 plus year member of Darien Woman’s Club, and an active member of my community- I am uncomfortable having to complain and ask for some help so that the value of our property is preserved. There is a time and a place for barn animals. I know raising chickens is a new fad. Please look into the ramifications of chickens in a residential area. There are many things to consider and possibly banning chickens altogether might be a more appropriate stand.
>>
>> Marie Freidag
>> 1009 Ironwood Ave, Darien IL
>> [redacted]
>> mariepchef@[redacted] <mailto:mariepchef[redacted]
>>
>> --
>> Marie Freidag
>> Independent Senior Executive Director at The Pampered Chef
>> [redacted]
>> mariepchef@[redacted] <mailto:mariepchef@[redacted]>
>> [redacted]>
>>

From: Whitney Kieca
To: Regina Kokkinis
Subject: Backyard Chickens
Date: Thursday, August 13, 2020 1:23:47 PM

Hi Regina,
I saw the post in Darien's e-newsletter about backyard chickens and wanted to email to let you know we have 4 egg-laying hens. They are confined to their coop most of the day and get about 10 to 20 minutes out of their cage in our fully fenced backyard to eat grass while my husband or I supervise them.

If you need to know anything else, please let me know.
Thanks,
Whitney Kieca
7210 Summit Rd.

From: Jennifer Murtoff
To: Regina Kokkinis
Subject: chicken ordinance
Date: Saturday, August 15, 2020 11:44:04 AM

Hello,
My name is Jennifer and I saw on Facebook that Darien is considering an ordinance on chickens and bees.
Since 2008, I have had a business in the Chicagoland area as a chicken consultant, helping families and organizations with their flocks, giving classes, and advising on best practices. I would welcome the opportunity to bring my experience to Darien's ordinance process. I have consulted/testified regarding ordinances for a number of municipalities, including Baltimore, MD, and I'm well versed in the needs of chickens, owners, and neighbors, as well as with the common concerns that arise around chicken keeping.

In addition, I know a number of beekeepers through the Chicago urban agriculture movement, and have a hive on my property.

Darien aldermen may be interested in attending the Chicago Coop and EcoYards Tour, Sept. 19-20. This annual event allows participants the opportunity to see urban and suburban coops and talk with the owners about their experiences.

You can find my blog at the link below.

Thank you for your consideration!
Jennifer

Jennifer Murtoff
Home to Roost Urban Chicken Consulting
My LinkedIn Profile

From: Dan Gombac
To: Kristina Nemetz; Regina Kokkinis
Cc: Joseph Hennerfeind; Bryon Vana; Tom Belczak; Joe Marchese
Subject: RE: Concern | Chicken Coop on Seminole & Ironwood
Date: Tuesday, August 18, 2020 2:37:33 PM
Attachments: [redacted]

Good afternoon Kristina,

Thank you for your e-mail and we will keep you posted regarding the upcoming discussions.

Regina,

Please add this e-mail as backup.

Daniel Gombac
Director of Municipal Services
630-353-8106
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: Kristina Nemetz <knemetz@[redacted]
Sent: Tuesday, August 18, 2020 2:25 PM
To: Dan Gombac <dgombac@darienil.gov>
Subject: Concern | Chicken Coop on Seminole & Ironwood

Hi Dan,

I hope this emails finds you well. As you can tell from my work signature below, I am all too aware of what municipal government looks like during a pandemic and especially in regards to resident concerns.

I grew up at 1009 Ironwood Ave. I lived in Darien from 1982-2002, 2005-2007, and again in 2017 (while we refinished our home). My parents are Jim & Marie Freidag. I understand this chicken thing is causing quite a stir. My email today is to not only express my sincere concern for this ordinance to be put in place, but for it **to be developed to protect the adjacent neighbors of both this chicken coop and others within the City limits**. A privacy fence **needs** to be a part of this ordinance and all current chicken owners should have to comply, nothing should be grandfathered in. This fencing should be at the expense of the chicken owners not the neighboring properties attempting to protect the value of their homes.

When the chicken coop was going up, I had my reservations, but my parents are truly good people and amazing neighbors and did their best to be supportive. They even attempted to mediate several times between other neighbors who were bothered by this. They have taken to playing with the kids next door (Melissa's), hanging out with them with the mom goes MIA (lots of on record mental issues), invites them over for bonfires, they even helped Melissa and Jim try a new business and they FUNDED their start-up kit. They still to this day snow plow the entire corner of Seminole and Ironwood, even in their mid-60s, because they are just GOOD PEOPLE. Did you even hear my dad last night offer to build the fence himself at his expense if the City would authorize him to? Unfortunately in the aftermath of last night, Melissa Goodrich has taken to social media to shame my parents publicly which is total uncalled for and is completely out of line. You mentioned Mediation at the meeting last night. I wanted to thank you in advance for taking this into consideration as at this point I am thinking it is going to be necessary. I am grateful for City staff such as yourself who is willing to help stop situations from getting worse.

You have a *renter* ridiculing and publically name calling, a longtime resident, senior couple. It is shameful and puts Darien in a negative spotlight. I am honestly concerned for my parents well-being. She is not mentally stable. Her social media posts

are irrational, her recalling of events is false, her argument lacks any sound understanding of civilian rights. In one post she cited this not being about the chickens, but about her “right as a millennial”. Many days the woman does not come out of her house and her parents never leave her alone in the house unless her kids are gone. She has been diagnosed bi-polar, police records probably will confirm this dating back several years even prior to her living on Seminole Drive on the other side of Darien. The yard is rarely ever kept clean. Honestly since she called the Darien Patch to come out for the story, the yard looks the nicest it has ever looked. Apparently it is “show time”, now that the media is involved.

Unfortunately for my parents, the media will stop covering this at some point and the yard without the restrictions of a privacy fence will go back status quo. I hate the thought that someone else’s actions will devalue the hard work and investment my parents have made into their house that they have called home since 1982. Let alone this could happen elsewhere in town to another family or someone who isn’t willing to speak up. When Melissa stated last night having chickens in the neighborhood would “attract younger residents” she is FAR from the truth. If you drove up to a home to look at it and your future neighbor’s yard looked like the property that Melissa Goodrich lives at PLUS it had a chicken coop, would you even go in the house for a tour? I am technically in that “millennial” age she is speaking of and I most definitely would not even get out of my car no matter how great a house might look on paper.

Dan, I know your job is not easy. I know the chickens are probably causing headaches that were not required in a time like this. I thank you in advance for your service to Darien and for your attention to resident concerns. I have worked with a lot of boards and councils in career and it was nice to know that Darien seemed to have many even-keeled individuals working and representing the City.

Thank you for your time and consideration. Please reach out with any questions.

Kristina Nemetz

From:	Dan Gombac
To:	Regina Kokkinis
Cc:	Mary Sullivan; Joseph Hennerfeind
Subject:	FW: Fly the coop
Date:	Tuesday, August 25, 2020 10:24:09 AM

Please add to b/u for MS

Daniel Gombac
Director of Municipal Services
630-353-8106

To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: Mary Sullivan <msullivan@darienil.gov>
Sent: Tuesday, August 25, 2020 7:36 AM
To: Joseph Kenny <jkenny@darienil.gov>; Tom Belczak <tbelczak@darienil.gov>; Eric Gustafson <egustafson@darienil.gov>; Dan Gombac <dgombac@darienil.gov>; Joseph Hennerfeind <jhennerfeind@darienil.gov>
Cc: Joe Marchese <jmarchese@darienil.gov>; Bryon Vana <bvana@darienil.gov>
Subject: Fwd: Fly the coop

Good day. I wanted all of you on Municipal Services to have this email from a resident regarding the Chicken ordinance that will be developed. Thank you.

Mary Sullivan
City of Darien Alderperson Ward 5

Begin forwarded message:

From: Kelly Glisan <[redacted]
Subject: Fly the coop
Date: August 17, 2020 at 11:49:19 AM CDT
To: Mary Sullivan <msullivan@darienil.gov>

Alderwoman Sullivan,
Foremost thank you for your service to the community and in particular Carriage Hill/Tara Hill.

I am writing in opposition to allowing chicken coops on the side of houses. Frankly, I was astonished it is even being taken seriously to allow these in the middle of subdivisions. If members of the community want to raise farm animals it is a matter of the most appropriate location. This middle of a cookie cutter residential subdivision is not the place, this is not the

community for them.

With some people it is all about them, not about the neighbor or the community. Darien is at a cross roads, do we want to be an upscale community like Hinsdale and Clarendon Hills or do we want to be a dump? If a neighbors house is for sale at half a million dollars is their house worth more or less money if their neighbor has a rickety dump of a chicken coop 3 feet off your lot line on the side of the house?

It think both answers are self-evident truths. My neighbor has sunk a ton of money in their forever home, we have also. The homes are built lot line to lot line to squeeze the largest home possible on the smallest lot because property in Darien is so expensive. Talk about "disrupting neighbors" both of us would freak out if the other put some rickety chicken coop on the side of the house off the lot line or even the rear. While we do not have the proverbial "million dollar views", we probably do have around $750K. views.

Lastly, I will readily admit I am never the smartest guy in the room, but even I can see through and call BS to the disingenuous claim that because of job insecurity it i*s necessary to grow your own eggs to defray costs. Really? Members of the community can generally catch a dozen eggs on sale for around $0.70, seventy cents a dozen. How many eggs can you really eat in a week? Someone that can't find the seventy cents in the couch cushion could go to OLMC Food Pantry if the seventy cents a week really makes the difference between going hungry or not. In addition, it probably costs more in feed, vett fees, time to grow eggs yourself than it costs to buy them. My wife loves to bake, it costs her $50 to make a cake from scratch that Wallmart sells for $20. I am not buying their contention that food insecurity is driving them to produce their own eggs, they must really think we are..... brain dead.*

I urge you to express vocal opposition and vote No to allowing chicken coops on the side of houses. There is a good article noted below.

Addie is graduating UofI at Semester. She had a strong MCAT score in the mid 90% so is now hoping to get into a medical school somewhere to continue her education, but it is competitive we will have to see and hope. Is Bridget graduating this year? Does Bridget have plans for graduate school or will she be entering the workforce? Bridget is a great kid, you an Mark did a great job parenting.

https://www.thehappychickencoop.com/why-you-should-not-get-chickens/

Kindest Regards,
Kelly Glisan

7 Reasons Why You Should Not Get Chickens

Posted by The Happy Chicken Coop on May 12, 2016 Posted In: Features

Many people get chickens thinking they are cute, easy to look after and do not require a great deal of maintenance.

After all, how much upkeep can a chicken require?

Unfortunately, this rosy outlook puts a lot of chickens into shelters, on the streets or killed because they did not meet the owners' expectations.

If you are looking at getting chickens but are not 100% sure, then this article is for you.

We have compiled a list of all the reasons to **not keep chickens**. We don't want to deter you from keeping these beautiful creatures, but for the best interests of you and the bird we are going to take a real world look at keeping chickens.

Chickens Can Be Expensive

Whilst the average chick will set you back about $3-5 per bird, there are plenty of additional expenses to keeping chickens.

The biggest will likely be your coop.

If you are handy and can build from scraps, a sturdy coop will set you back less than around $100.

A simple DIY chicken coop

It's also possible to re-purpose a garden shed or small outbuilding too.

To buy a ready-made coop for a few hens will cost you upwards of a few hundred dollars, depending on what you want. Often, the advertising of these coops are optimistic- to say the least! A large hen such as a Rhode Island Red, requires about 4 square feet of per chicken. So, if you bought a coop that says it will house six hens, it probably will house four comfortably.

Another hefty expense can be your equipment: feeders and drinkers in particular.

These don't have to be expensive and there are plenty of homemade or re-purposed chicken feeder and drinkers. If you decide on secondhand, make sure they are well cleaned and disinfected before you use them with your flock.

And finally, a sometimes forgotten recurring cost is feed- depending on how many chickens you have will determine how much feed you use. I have 30 chickens and they eat about 50lb every two weeks, so roughly $6 a week.

To help you figure out the cost of feed, an average hen will eat between ½ – 1 cup of feed/day.

Other items your chickens will need are grit, oyster shell, vitamins/electrolytes, dusting powder and any toys you may buy them.

The 'Ewww' Factor

Chickens can get lice and mites, not to mention intestinal worms and other icky parasites. Are you up to dealing with these?

Truthfully, in five years I have dusted my birds only a handful of times since they have had few lice. They dust bath themselves regularly, so keep the parasites in check for themselves.

I have however trimmed ‘poopy’ feathers from around the vents- this is not for those who have a delicate constitution and it needs to be done to prevent maggot infestation in the summer.

The hens’ usually sit quietly for me, but I have a few that are convinced I’m going to kill them, so it becomes a struggle to see who wins out!

A note on dust bathing- chickens need somewhere they can dust. We have shown you how to make a simple dust bath in a previous article. However, they will still make your garden look like it has survived a bomb blast. They love to make several small depressions in the garden for their own personal spa!

A poor garden which the chickens have ‘scratched’.

The big concern most neighbors voice is rodents. Where there is food there will be mice or rats. If you keep your feed stored securely, there really should not be a problem, but keep your eyes open.

Using a metal container is best, but a plastic tote bin works well also. Make sure you check the plastic bin frequently for any sign of gnawing on the plastic- rodents can be very determined!

How Is Your Health?

If you suffer from allergies or respiratory problems, you must think very seriously about keeping birds- chickens or otherwise.

The dander and dust created by birds is an allergen and it can occasionally causes reactions in people.

Many people raise chicks inside their house until they are big enough to go outside- the amount of dust created is huge and anyone suffering from asthma or similar ailments will be highly stressed.

If the allergy is mild and you want chickens anyway, a facemask will help to keep the dust from bothering you.

Do You Have a Backup Plan?

Having pets or livestock is a big undertaking. You should always discuss it with your family.

What will happen if you are unable to take care of your birds for a few days? Will a family member take over- or will the birds be left alone?

If you don't have a back-up plan for the welfare of your birds, think carefully now about what will happen to the birds in an emergency. They are living, breathing creatures that depend upon you to care for them.

Many families make chicken keeping a 4H activity which teaches children about keeping and caring for livestock. It's a great educational experience and may be the best route to decide whether or not keeping chickens is for you.

If you have a dog in the family it could be a problem. Dogs love to chase things and chickens are no exception. You have to train your dog to accept the birds and leave them alone or fence the birds in well so the dog cannot access them.

Hens Stop You Going On Vacations

If you regularly go on vacation you need to check that your usual pet-sitter is ok with chickens.

Some people are terrified of birds- this would be good to know before the vacation starts!

Chicken sitting is a bit different to regular pet-sitting. They have to be let out in the early morning, fed and watered, eggs collected and in the evening they need to be securely locked in.

Your ‘sitter’ must be diligent about this otherwise you may come home to find the local fox had chicken for dinner…

A friend recently went on vacation and came home to find the chickens had not been fed for a couple of days, eggs had not been collected and she now had four broody hens!

They Lay Lots of Eggs

Hopefully, this is one of the reasons you are considering adding chickens to your home, but if you aren’t ready to collect eggs, eat them, sell them, or give them away on a regular basis then take a hard pass on chickens.

Most hens lay about an egg a day, and if you don’t plan on collecting them, they will end up all over the coop, dirty and cracked.

Additionally, uncollected eggs are a magnet for predators and rodents, especially in the winter. Raccoons, snakes, and even barn cats love to eat eggs, and if they've found their own egg factory, guess where they will be setting up shop?

So, if you decide to get chickens, make sure you have a daily plan to collect the eggs, and a place to put them. Whether that's in your own tummy or your neighbors; someone will appreciate them.

Summary

We have given you much to think about here. Caring for chickens is usually pretty straight forward, but you must be prepared!

If you've read this and aren't deterred, the best advice we can give is start small with a few hens and read this advice from 47 chicken keepers.

Some people *'collect'* hens because they have pretty feathers or lay blue eggs. Decide what you want and stick with it.

Many online hatcheries will supply you with small order numbers and can give you one each of what you want.

So, as always- do your homework and decide what's right for you.

For those of you who have decided to get some chickens- welcome to the world of crazy chicken people!

If you already have chickens, let us know in the comments below advice for new chicken keepers…

Read Treats That Will Make Your Hens Lay More Eggs

From: b57@[redacted]
To: Regina Kokkinis
Cc: Tom Belczak
Subject: City Considers Ordinance on Chickens and Beekeeping
Date: Thursday, August 27, 2020 11:56:10 AM

RE: City Considers Ordinance on Chickens and Beekeeping

Regina,
My name is Bob Stevens and I live at 7228 Leonard Drive and I would like to offer my opinion on the ownership of chickens.

My neighbor directly west of me has chickens, there address is 7305 Richmond. I am firmly against anyone having chickens because of the following reasons,

- While chickens are mostly quiet they can be very loud at times, especially in the morning. They can sometimes cluck for 30 minutes or longer. Compound this by the number of chickens.
- They can be very bad smelling, especially when the weather goes from cool to hot in a short period. My back yard sometimes smells like the aviary at the Brookfield Zoo!
- I have noticed mice more frequently now that I have chickens as neighbors.
- Roosters should definitely not be allowed. I had to deal with the noise all day long for a couple weeks before I complained to the city. They were asked to get rid of the rooster, which they did.

Another important issue is the number allowed. My neighbor has six. Also something which adds to the above problems is other birds. My neighbor has six to eight ducks to go along with the chickens. I think if there is a limit on chickens it should include all birds.

Overall I do not think it is healthy to allow chickens or other birds, especially in larger numbers. I guess if you allow chickens why not pigs and goats? Not really the things to keeps on lots as small as a quarter acre.

One interesting note is I called the city to complain about the noise from the chickens. When a Community Service Officer showed up I was told there was nothing that could be done because there is no ordinance about chicken noise. I really don't see the difference between a dog barking or a chicken clucking, they are both a nuisance. If this is really correct then noise from any animals should be added to any ordinance being considered.

If the ownership of birds, chickens and ducks, are allowed I think a periodic soil sample should be taken to check for anything which might be considered unsafe. I'm not very enthusiastic about 12 or more birds using a small area of a yard as a bathroom. Some type of assurance of safety and cleanliness would be appreciated.

Feel free to pass this along,

Thanks,
Bob Stevens
Down on the farm?

CC: Tom Belczak

Regina Kokkinis

From: b57@[redacted]
Sent: Sunda 0, 2020 8:39 PM
To: Regina Kokkinis
Cc: Tom Belczak
Subject: RE: City Considers Ordinance on Chickens and Beekeeping
Attachments: chicken noise 2.mp4

Regina,
I've attached a video which I recorded for sound only to help convey how annoying chickens can be. My original video was around 7 minutes but was too large to email. This one is just 40 seconds but in actuality the noise can go on for 30 minutes. Please ad this to go along with my other email.

Thanks,
Bob Stevens

From: Regina Kokkinis <rkokkinis@darienil.gov>
Sent: Thursday, August 27, 2020 12:05 PM
To: b57@[redacted]
Cc: Tom Belczak <tbelczak@darienil.gov>
Subject: RE: City Considers Ordinance on Chickens and Beekeeping

Good Day,

Thank you for your interest in the City of Darien.
Your comments have been received and will be included in the packet provided to Council.

Thank you,

Regina Kokkinis
Administrative Assistant, Municipal Services
City of Darien
630-353-8105
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: b57@[redacted] <b57[redacted]>
Sent: Wednesday, August 26, 2020 7:10 PM
To: Regina Kokkinis <rkokkinis@darienil.gov>
Cc: Tom Belczak <tbelczak@darienil.gov>
Subject: City Considers Ordinance on Chickens and Beekeeping

RE: City Considers Ordinance on Chickens and Beekeeping

Regina,
My name is Bob Stevens and I live at 7228 Leonard Drive and I would like to offer my opinion on the ownership of chickens.

My neighbor directly west of me has chickens, there address is 7305 Richmond. I am firmly against anyone having chickens because of the following reasons,

- ✓ While chickens are mostly quiet they can be very loud at times, especially in the morning. They can sometimes cluck for 30 minutes or longer. Compound this by the number of chickens.
- ✓ They can be very bad smelling, especially when the weather goes from cool to hot in a short period. My back yard sometimes smells like the aviary at the Brookfield Zoo!
- ✓ I have noticed mice more frequently now that I have chickens as neighbors.
- ✓ Roosters should definitely not be allowed. I had to deal with the noise all day long for a couple weeks before I complained to the city. They were asked to get rid of the rooster, which they did.

Another important issue is the number allowed. My neighbor has six. Also something which adds to the above problems is other birds. My neighbor has six to eight ducks to go along with the chickens. I think if there is a limit on chickens it should include all birds.

Overall I do not think it is healthy to allow chickens or other birds, especially in larger numbers. I guess if you allow chickens why not pigs and goats? Not really the things to keeps on lots as small as a quarter acre.

One interesting note is I called the city to complain about the noise from the chickens. When a Community Service Officer showed up I was told there was nothing that could be done because there is no ordinance about chicken noise. I really don't see the difference between a dog barking or a chicken clucking, they are both a nuisance. If this is really correct then noise from any animals should be added to any ordinance being considered.

If the ownership of birds, chickens and ducks, are allowed I think a periodic soil sample should be taken to check for anything which might be considered unsafe. I'm not very enthusiastic about 12 or more birds using a small area of a yard as a bathroom. Some type of assurance of safety and cleanliness would be appreciated.

Feel free to pass this along,
Thanks,
Bob Stevens
Down on the farm?

CC: Tom Belczak

From: Heather Conroy
To: Dan Gombac
Cc: Tom Belczak; Regina Kokkinis; Joseph Hennerfeind
Subject: Re: Village 8/17/20 Presentation-Chicken/Egg Raising
Date: Tuesday, September 1, 2020 8:01:50 AM

Hi Dan,

As for the ventilation, 3 six-foot walls would highly decrease ventilation. This puts the chickens at risk of overheating and even dying. I saw on other groups this past weekend some members lost chickens from overheating. Chicken owners purposely build structures with a lot of ventilation for this reason. Also, with less air flow that creates more possibilities for odor and flies to accumulate. You want as much air flow as possible. Many chicken owners will add fans to their runs to increase air flow for all of these reasons. I have attached some pictures for reference and can provide more from my local members if you need more. There is also good information in this PDF as well on ventilation: https://afs.ca.uky.edu/files/chapter7.pdf

I dont think a fence should be required at all. It solves no problems and if anything will create problems as I described above. The chickens are in an enclosed run. This ordinance is directed to one current Darien chicken owner and only an issue because of a couple of complaints. Making a law for one person because of one other person is not a democracy. It is not Melissa's fault that her property is a corner lot. Her coop is in the backyard. A fence like this is not just and would only create more problems for both sides. Please allow this domestic dispute to stay out of law making.

As long as the chickens are secure in their enclosure, there is no functional purpose for an extra barrier. It doesn't eliminate the large structure or any other complaints that have been brought up. You also do not want to shade them as they need 14 hours of sunlight to produce. The trees are interesting, and I would like to know more about that idea...how far apart would they be? How much does one 6ft tree cost (I'm thinking a lot)? How many is sufficient for compliance? While I think that is an interesting option and would be better for ventilation... depending on location and property and lines, it could be shading the coop which we try not to do since they need so much sunlight. Shading the coop is not good for chickens, eggs, or bugs.

Sincerely

Chapter 7 – VENTILATION PRINCIPLES

Contents:

A. Economic importance of ventilation

Changes in the modern broiler chicken have increased the importance of in-house environmental conditions. In response to market requirements, geneticists have raised growth rate as well as the yield of the carcass components. The extra meat yield in these broilers, most of which is concentrated in the breast, makes the broiler more sensitive to high temperatures, ammonia, and dust. As a result, much of the difference in performance of broiler flocks can be attributed to how well the in-house environmental conditions are managed, especially **temperature** and **air quality**.

The main objective of the broiler industry is the production of SALEABLE chicken meat. To this end, it is important to maintain a healthy environment in the poultry house. Problems maintaining the correct environment, in terms of temperature and air quality, will adversely affect broiler health, live weight, feed conversion, carcass quality, and carcass yield, all factors which adversely affect the grower's bottom-line and could be the difference between a below average and a high performing flock.

Modern broiler genetic lines have been selected for growth rate, most of which is determined by the broiler's desire to eat. If temperatures are too high, broilers will not eat as much as they could or will not eat at all. Thus, managing in-house conditions to realize the genetic potential of broilers is largely a function of optimizing the ventilation system.

B. Air quality

Air is a mixture of **water vapor**, **nitrogen**, **oxygen**, **carbon dioxide** and traces of other gases. Although its water vapor content is often less than 1% of the total, it is a major factor in determining the condition of the air mixture. This is due not only to the necessity of water in the life cycle but also to its great energy content when in vapor form. The **latent heat in water vapor** (the energy in the form of heat required to change water from liquid to vapor) is the largest of any common liquid. As a result the small amount of water vapor in the air mixture often contains the major part of the total heat energy of the mixture.

When allowed to accumulate to above acceptable threshold levels, air contaminants lead to poor air quality within the poultry house. Contaminants include solid particles; microorganisms such as bacteria, fungi and viruses; and gases such as ammonia, hydrogen sulfide, and carbon dioxide. These contaminants are always present to some extent in poultry house air, but can be minimized with a well-managed ventilation system.

The by-products of broiler production include heat, water, carbon dioxide and droppings, all of which are added to the environment inside the poultry house. When poultry droppings decompose in the presence of moisture and heat, **ammonia** is released into the air. **Dust particles** of dried droppings, feather and skin scales, and some feed become airborne. **Microorganisms**, including pathogenic bacteria and viruses, may be associated with the dust particles. **Spores** of harmful fungi such as *Aspergillus fumigatus* may also be present. The interaction of these various contaminants with litter conditions and temperature is the major cause of poor air quality and airsacculitis. In **airsacculitis** the lungs and air sacs become plugged with fluid (see Chapter 3 for more information on air sacs). Affected broilers will gasp for air and often die suddenly. As a result, high mortality is often observed near market time so that after feeding a broiler for the majority of the growout period the broiler does not make it to the processing plant. Additional losses to the grower can be incurred by condemnation of carcasses during processing (see Chapter 4 for the various causes of carcass condemnation).

Ammonia is a colorless gas produced by microbial decomposition of nitrogenous compounds (protein, amino acids, and non-protein nitrogen) in the litter. Litter contains a diverse population of **microorganisms** that produce the enzyme urease, which converts the nitrogen into ammonia. Moisture, temperature, and pH of the litter also play an important role in the conversion of nitrogen into ammonia.

It is recommended that ammonia concentration be maintained at < 25 ppm throughout the growout for optimum broiler performance. When a person is constantly exposed to ammonia their sense of smell is adversely affected and their ability to detect ammonia decreases. With time, most growers are not able to detect ammonia by smell until the ammonia concentration in the broiler house has reached 50-60 ppm or higher. By this time, however, chick performance can be severely affected. In a study conducted at the USDA laboratory in Mississippi they noted that the difference in body weight from broilers exposed to 25 ppm vs. 50 ppm ammonia was 0.31 lb/broiler. With a flock of 25,000 broilers, this is equal to a loss of 7,750 lbs/flock. The best method to minimize ammonia during the growout is to properly ventilate. Litter amendments can be an

effective management tool to reduce ammonia (see Chapter 14 for more information on litter amendments), but they are NOT a substitute for proper ventilation.

> *"The best method to minimize ammonia during the growout is to properly ventilate. Litter amendments can be an effective management tool to reduce ammonia, but they are NOT a substitute for proper ventilation."*

Air in poultry houses should have less than 5 milligrams per cubic meter (mg/m^3) dust at broiler level. Dust levels of 8 mg/m^3 can be tolerated if the broilers are not being stressed by ammonia, heat, or the presence of respiratory disease agents. Good air quality management practices require heating and ventilating systems that provide a balanced environment. Poor respiratory health is the consequence of not providing this balance. Humidity and temperature also have an impact on air quality by influencing the survival of some pathogens and the severity of some diseases. ***Ventilation is an important consideration for controlling heat and humidity***.

Particles that are very harmful to both poultry and humans are those that can be inhaled and deposited within the lower respiratory system (see Chapter 3 for an overview of the avian respiratory system). These are known as **'respirable' particles**. Particles containing live microorganisms are known as **'viable' particles**. Respirable particles and microorganisms are roughly 200 times smaller than a pencil point, having diameters less than 5 microns (a micron is one millionth of a meter). Most larger-diameter respirable particles are trapped by surfaces in the upper respiratory system of the nose and trachea. Particles with diameters smaller than 0.5 micron follow airflow patterns and are inhaled and are frequently deposited in the lower lung. If a respirable particle is a pathogenic microbe, a respiratory infection can occur. If the pathogen slips into the bloodstream (exchanged, as is oxygen), a serious system infection can occur. **Endotoxins** are released from dead bacteria and can produce many harmful symptoms in poultry and humans that inhale them. Endotoxins are especially troublesome because they resist sterilization and, therefore, cannot be easily cleaned from an environment.

Aerosol particles can have a range of effects on poultry. They act as irritant to the respiratory system and coughing is a response designed to remove them. Excessive coughing lowers the broiler's resistance to disease. Aerosol particles collected inside the broiler increase condemnation of meat at the processing plant (see Chapter 4 for the various causes of carcass condemnation).

There are several methods that may be used to ***reduce aerosol generation or reduce aerosol concentrations***. Proper ventilation is essential for bringing clean outdoor air into a poultry house to replace contaminated air. If houses are under-ventilated, aerosol concentration will continue to increase as more particles are produced by the birds without a means to dilute particle concentration.

The moisture content of air and floor litter impacts particle generation. If floor litter is excessively dry, air and bird movement tend to increase the amount of particles in the air. Misting systems may be used to moisten dry, dusty litter. Spraying vegetable oil has been shown to reduce particle generation in swine housing.

The most prevalent noxious gas in poultry housing is ammonia (NH_3). Exposure to high concentrations of ammonia for extended periods has serious consequences on human and poultry respiratory health. Airborne ammonia is generated from the **volatilization** (vaporization) of decomposed uric acid in chicken manure. Microbial decomposition of uric acid to ammonia and carbon dioxide is a function of the litter moisture content, temperature, and pH, all of which influence the number and type of microorganisms (bacteria and fungi) present in the litter.

Poultry are adversely affected by high ammonia concentrations in a number of ways. Keratojunctivitis, an infection of the eyes, has been observed at concentrations of ammonia as low as 50 ppm**. Ammonia blindness** is seen five to seven days after the damage has been done. Long-term exposure to ammonia concentrations breaks down the broiler's first defense against infection in the respiratory system. Ammonia-laden air destroys **cilia in the trachea**, which impairs mucus flow and thickens tissue around the alveoli. This damage makes broilers more susceptible to respiratory infections, such as Newcastle disease and air sacculitis. As previously indicated, ammonia concentrations ranging from 25 to 50 ppm over a 4-8 week period have been shown to reduce weight gains and feed efficiency.

C. Air temperature

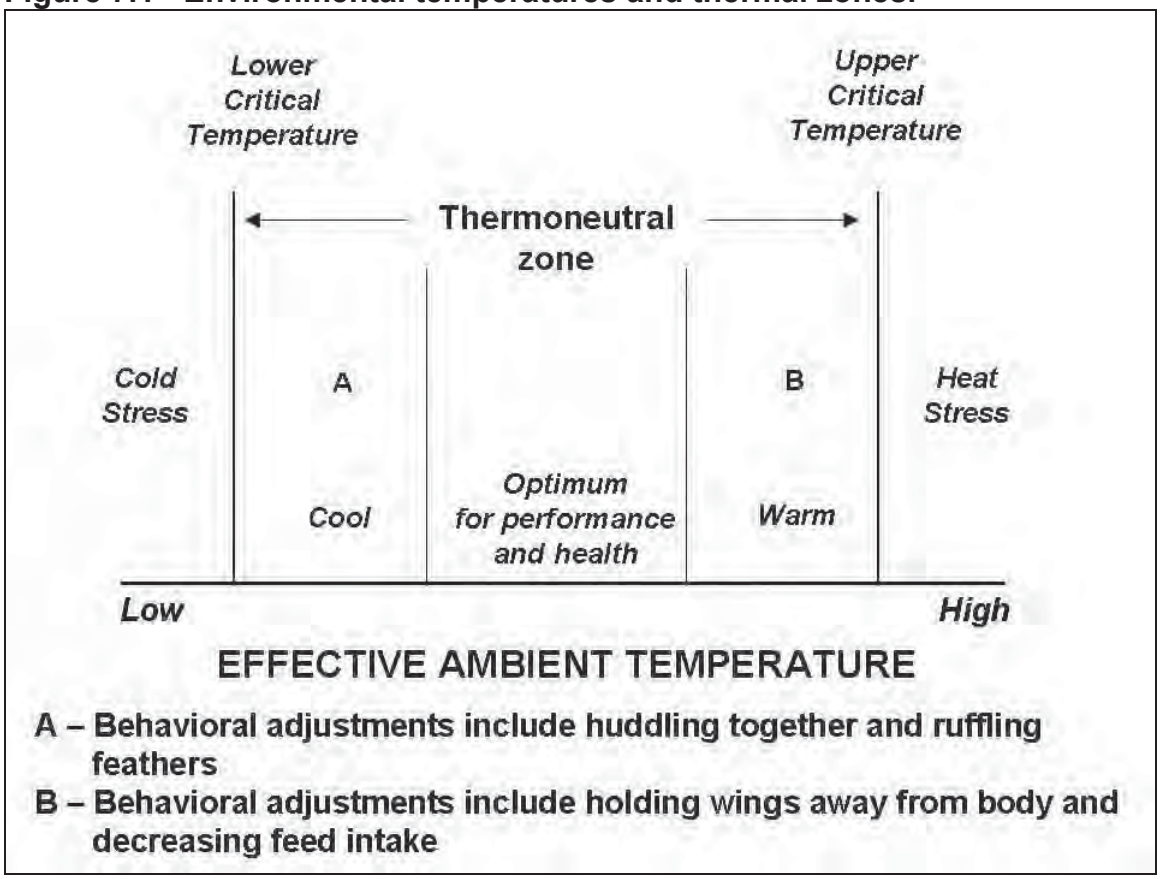
Birds are **homeothermic** – they produce and dissipate heat to maintain a relatively constant body temperature. The **internal body temperature** of birds shows more variability than mammals, and therefore there is no absolute body temperature. In the adult chicken the variability is between 105°F and 107°F (40.6° and 41.7°C). The body temperature of a newly hatched chick is about 103.5°F (39.7°C), and increases daily until it reaches a stable level at about three weeks of age. Smaller chicken breeds have a higher body temperature than larger breeds. Male chickens have a slightly higher body temperature than females, probably the result of a higher metabolic rate and larger muscle mass. Activity increases body temperature. For example, the body temperature of chickens on the floor is higher than that of chickens kept in cages.

Birds have feathers that help them regulate their body temperature. Their relatively high body temperature makes it easier for them to lose heat into the air around them. Their air sacs (see Chapter 3 on avian anatomy and physiology) allow inhaled air (usually cooler than body temperature) to reach deep into the abdominal capacity so when the bird exhales heat is removed from the body. **Birds do not have sweat glands**. Broilers use a **panting mechanism** (referred to as **gular flutter**) during hot weather to evaporate water from its throat, thus reducing body temperature. Panting is extremely effective in cooling birds. Feathers are great insulation in cold weather but inhibit heat loss in hot weather.

As previously stated chickens are homeothermic and have the ability to maintain a rather uniform internal body temperature (homeostasis). However, the mechanism for accomplishing this is efficient only when the ambient temperature is within certain limits; chickens are not able to adjust well to extremes. It is important, therefore, that broilers be housed and cared for so as to provide an environment that will enable them to maintain their thermal balance. This is known as the **thermoneutral zone** (see Figure 7.1) which

is a range of temperatures at which an animal does not have to actively regulate body temperature. There is considerable margin in cold weather, a chicken's body temperature can drop to as low as 73°F before death occurs. However, there is much less flexibility on the high side. The upper lethal limit on body temperature is 113-117°F.

Figure 7.1 - Environmental temperatures and thermal zones.



Note: Thermoneutral zone is the range of temperatures at which an animal does not have to actively regulate body temperature

The poultry **thermal comfort zone**, or **thermoneutrality**, depends on species and age, with younger birds responding better to warmer temperatures. ***Broiler feed conversion deteriorates when temperatures are outside the recommended comfort zone***. Bird responses are predominantly affected by the dry-bulb temperature of the air space.

Broilers produce heat that must be lost to the environment to maintain constant body temperatures. Broiler heat loss is comprised of two components; latent heat loss and sensible heat. **Latent heat loss** is usually expressed as the amount of water evaporated from the broiler, referred to as moisture production. Evaporation uses broiler heat to change water state from liquid to vapor. The evaporation takes place inside the broiler as water passes over the wet surfaces of its respiratory system. **Sensible heat loss** refers to heat dissipated through heat transfer from the broiler to the surrounding air. If the air is cooler than the broiler's surface temperature, heat flows from the broiler to the surroundings. If the air is warmer than the broiler's surface temperature, broilers will not be able to dissipate heat and **heat stress** will occur.

Air temperatures that cause heat stress and mortality are considerably below broiler body temperature. Broiler surface temperatures typically range from 95-100°F, with skin temperatures warmer than feathers. Air temperatures in this range can virtually stop heat loss from the broiler and accelerate heat prostration. For this reason, an important goal for hot weather ventilation systems is to keep air temperatures below 95°F.

During cold weather, the optimal temperature may depend on feed prices. When feed price is high, temperatures at the high end of the comfort zone may be more economical since higher temperatures improve feed conversion. When feed prices are low (or fuel costs are high), lower temperatures would increase feed consumption but save on supplemental heating costs. ***The right management strategy needs to be determined for each situation.***

Broiler mortality is influenced by their thermal history. Once acclimated to heat stress, broilers can tolerate higher temperatures that would have been lethal to a large portion of the flock during the first exposure. Consequently, some producers gradually raise the temperature set point for cooling systems before arrival of a heat wave in an effort to prepare broilers to combat heat stress. However, extreme caution must be exercised when employing new control or management strategies that attempt to improve profitability but might also affect mortality rates.

Heat stress in poultry is a serious problem for the poultry industry. Mortality during extremely hot weather can be significant, especially when combined with high humidity. However, probably ***even more costly is the routine loss of weight and feed conversion efficiency during less severe periods of heat stress***. Under normal conditions, chickens do a good job of cooling themselves with physiological and behavioral mechanisms. One of the keys to minimizing production losses during hot weather is proper ventilation system design.

Although air temperature represents the major component of the thermal environment, the term ‘effective temperature’ describes the combined effects of air temperature, air velocity, relative humidity, and radiation. The concept of **effective temperature** recognizes that the broiler regulates heat dissipation and thus maintains homeostasis by integrating all the environmental factors. Effective temperature is particularly useful when the air temperature is below or above the thermal comfort zone.

Over the last decade, there have been tremendous changes in broiler strains. As broiler nutrition improves and daily gain increases, the pattern of broiler heat loss has changed, and ***older data on heat loss have become obsolete***. Heat and moisture production data for broilers that required ten weeks to reach a 4 lb body weight are very different than that for broilers that will reach the same weight in six weeks. Caution is needed when applying historical data.

Daily fluctuations in temperatures may result in temperatures outside the thermal comfort zone. As long as the **daily mean temperature** remains in the comfort zone, mature birds can tolerate a temperature cycle of ± 15-20°F without adverse effect on performance. The cycle range of ± 15-20°F should be applied with caution as it will vary with species, age, nutrition, and other stress factors. For instance, young chicks or poults that have just been set in the brooder house will benefit from a ‘draft-free,’ constant-temperature

environment while fully-feathered birds may actually benefit from temperature fluctuations. In general, temperature variations should be minimized until the broilers are fully feathered.

The inside surfaces of the walls and ceiling radiate energy based on their temperature. During warm periods, **radiant heat loads** from these surfaces and sunlight coming through open sidewalls or curtains will contribute to heat stress on the birds.

By contrast, in cooler weather, the relatively warm broiler body will lose radiant heat to its colder walls and ceiling. ***A primary function of insulation is to keep the interior surface of the wall or ceiling closer to the interior temperature to minimize radiant heat loss from the birds***.

Radiant heaters direct heat toward the floor and broilers to provide localized heating while allowing lower room temperatures. This reduces building heat losses and saves fuel during brooding periods when young broilers need high temperatures. The radiant heat effect diminishes with distance from the heater.

D. Moisture

Relative humidity is a measure of how saturated the air is with water vapor. When the relative humidity is 100% the air is saturated. Air can hold more water vapor as it gets warmer. So, 70°F air at 100% relative humidity will be holding less water than 90°F at 100% relative humidity. If this same saturated 70°F air is warmed to 90°F, its capacity to hold water vapor will increase. If relative humidity is too low, litter dries and the amount of dust in the air increases. This may adversely affect the broiler's respiratory system. Air relative humidity (RH) of 30-75% has little effect on birds IF temperature is in the thermal comfort zone.

E. Relationship between temperature and moisture

Psychrometrics is the study of the physical and thermal properties of air and water vapor mixtures. The air's capacity to absorb heat and moisture depends on its characteristics. Seven physical and thermal characteristics are used to describe air and water vapor mixtures. An understanding of these characteristics and their relations to each other will help to better understand ventilating principles.

The seven physical and thermal properties are:

Dry-bulb temperature	°F
Humidity ratio	lb H_20 / lb dry air
Relative humidity	%
Enthalpy	BTU / lb dry air
Dew-point temperature	°F
Wet-bulb temperature	°F
Specific volume	ft^3 / lb dry air

The interrelationship between air and the moisture it holds provides the basis for maintaining a suitable environment. The above seven properties are used to describe ventilation principles. A **psychrometric chart** is a convenient way to graphically describe the interrelationships between the seven physical and thermal properties. Knowing any two of the psychrometric values defines the other five values.

WHAT IS A 'BTU'?

A **B**ritish **T**hermal **U**nit (BTU) is the amount of heat energy needed to raise the temperature of one pound of water by 1°F. This is the standard measurement used to state the amount of energy that a fuel has as well as the amount of output of any heat generating device, including chickens in a poultry house.

All combustible materials have a BTU rating. For instance, propane has about 15,000 BTUs per pound. Charcoal has about 9,000 BTUs per pound and wood (dry) has about 7,000 BTUs per pound.

Although it is still used 'unofficially' in some metric English-speaking countries (such as Canada, the U.S. and the United Kingdom), its use has declined or has been replaced in other parts of the world. In scientific contexts the BTU has largely been replaced by the International system of units (abbreviated **SI** from the French *Le **S**ystème **I**nternational d'Unités*) of energy, the joule (J), though it may be used as a measure of agricultural energy production (BTU/kg).

Dry bulb temperature is the regular temperature measured using either a common thermometer or other temperature sensor. It describes how hot or cold the air is. Temperature is commonly measured in degrees Fahrenheit (°F) or degrees Celsius (°C) (see Figure 7.2 for conversions). Dry-bulb is sometimes abbreviated 'db'.

Humidity ratio is a very important air characteristic even though it is not commonly used outside of engineering. The humidity ratio describes the **moisture holding capacity** of the air. There is no common way to directly measure humidity ratio. Values are very small and can range from 0 to 0.044319 lb H_2O/lb dry air for saturated air at 100°F db.

Saturated air is air that is holding the maximum amount of moisture possible to hold in the air. The common rule of thumb is that the moisture holding capacity of saturated air doubles for every 20°F increase in temperature. Fifty degree air holds 0.0077 lb H_2O/lb dry air which is slightly more than double the moisture holding capacity at 30°F, 0.0035 lb H_2O/lb dry air. Similarly, 70°F air holds 0.0158 lb H_2O/lb dry air, which is about double the moisture holding capacity of 50°F air.

Relative humidity is a term commonly used to describe how much water vapor is in the air as a percent. Saturated air is at 100% relative humidity (RH). Air with a 50% RH and 100°F contains half the water vapor of saturated air at 100% RH and 100°F.

Enthalpy describes the heat energy content (BTU/lb dry air) of the air and water vapor mixture. The air's energy content changes if either or both the dry-bulb and humidity ratio change. Therefore enthalpy (energy) is important not only in heating and cooling processes but also in humidifying and dehumidifying processes.

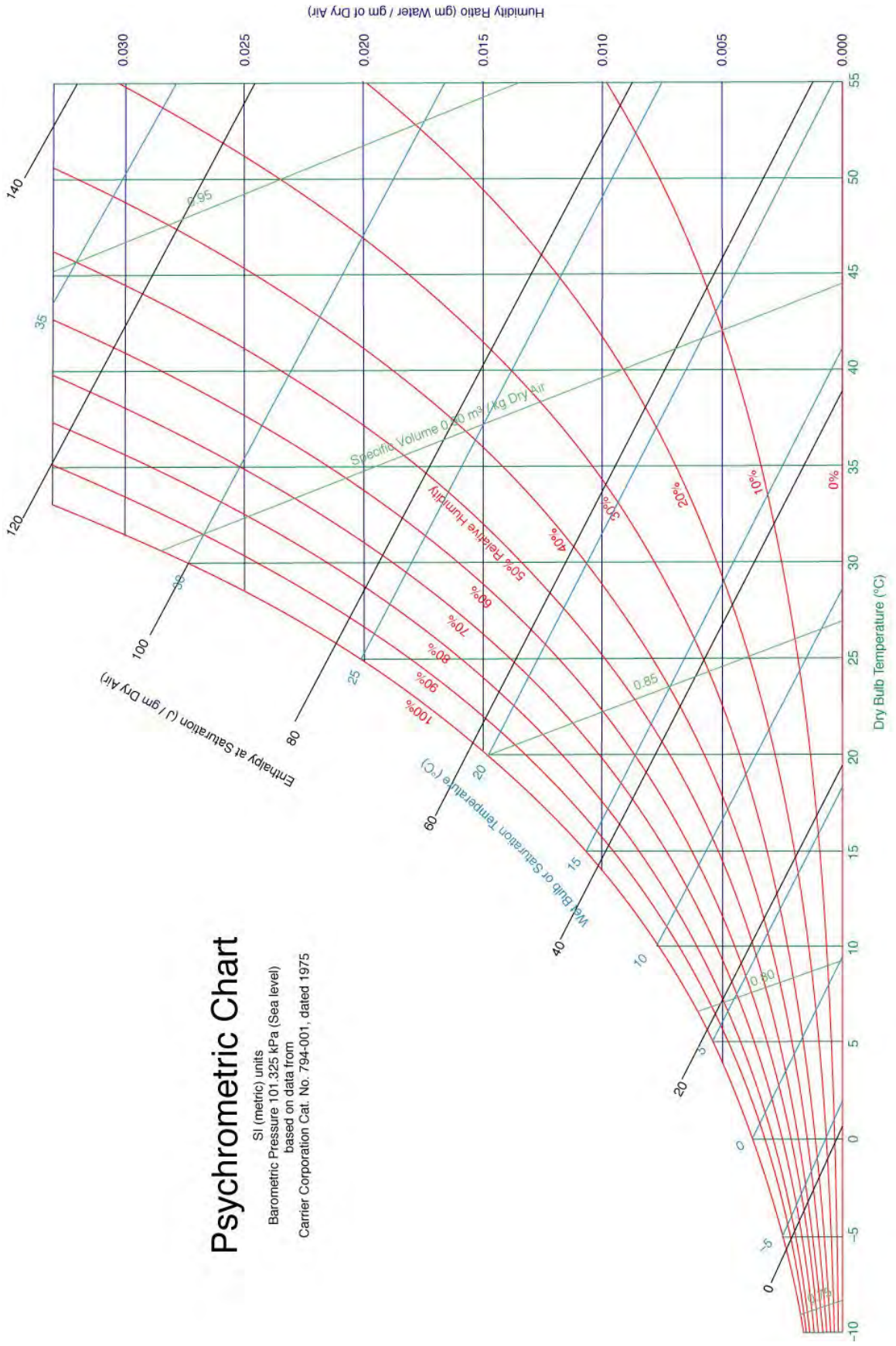

Psychrometric Chart
SI (metric) units
Barometric Pressure 101.325 kPa (Sea level)
based on data from
Carrier Corporation Cat. No. 794-001, dated 1975
Humidity Ratio (gm Water / gm of Dry Air)
Dry Bulb Temperature (°C)
Wet Bulb or Saturation Temperature (°C)
Enthalpy at Saturation (J / gm Dry Air)
Specific Volume 0.80 m³ / kg Dry Air
50% Relative Humidity
0.95
0.90
0.85
0.80

Figure 7.2 - Comparing Celsius and Fahrenheit temperature scales on a dry bulb thermometer.

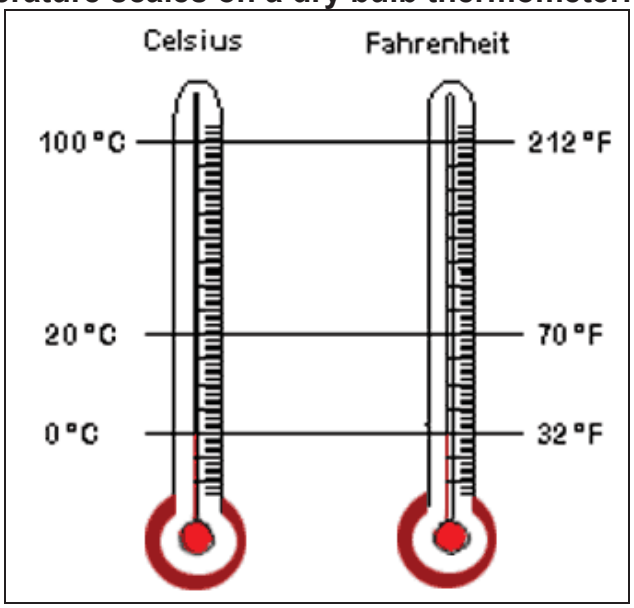
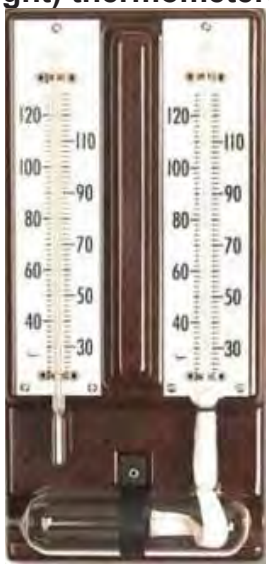


Figure 7.3 - Comparing dry bulb (on left) and wet bulb (on right) thermometers.



Dew-point temperature is the temperature at which moisture starts to condense from the air at a constant humidity ratio. Dew-point temperatures are commonly reported in weather reports to indicate the **amount of moisture in the air**. It is directly related to the humidity ratio. Surfaces (i.e., sides of cold drinks with ice, inside building surfaces) at temperatures below the air's dew-point temperature will have **condensation** forming on them. Frost is condensation on surfaces at temperatures below freezing. In poultry houses insulation is needed in cold weather to keep the walls and ceilings above the dew-point temperature to prevent either condensation or frost formation.

Wet-bulb temperature is a temperature measured by a thermometer with the bulb or sensor covered with a water moistened wick in a moving air stream (see Figure 7.3). The wet-bulb temperature is always below the dry-bulb temperature. The difference between wet and dry-bulb temperatures is important in **evaporative cooling**.

Specific volume is the volume in cubic feet occupied by a pound of dry air at a specific dry-bulb temperature and pressure, expressed as cubic feet per minute (CFM) to mass (pounds) of dry air being exchanged during ventilation.

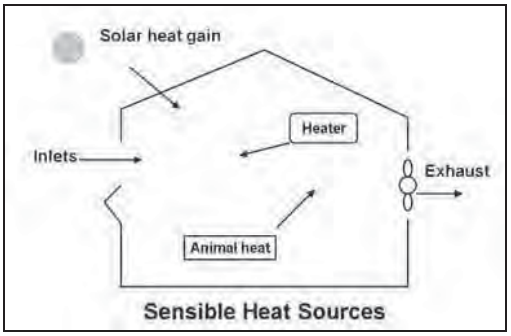
Sensible heat is heat that produces a change in the dry-bulb temperature. It takes approximately 0.24 BTU to raise one lb of dry air 1°F. Supplemental heaters are used to add sensible heat to the air to maintain a desired temperature.

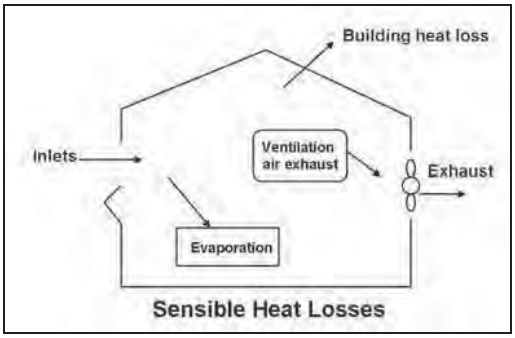
Latent heat (of vaporization) is heat used to evaporate water. Evaporation changes liquid water to water vapor. The air's latent heat changes if and only if there is a change in the air's humidity ratio. The amount of heat energy needed to evaporate a pound of water does vary with temperature but it is common to use a value of 1,044 BTU/ lb H_2O for processes involving agricultural animals.

F. Air exchange for temperature control

Relationships among the psychrometric characteristics play important roles in the ventilating process. To control the temperature within a building the sensible heat produced by the broilers and supplemental heaters and the heat either gained or lost through the building surfaces (i.e., ceiling, walls, windows, etc.) must be balanced with the heat removed by the ventilation air (see Figure 7.4).

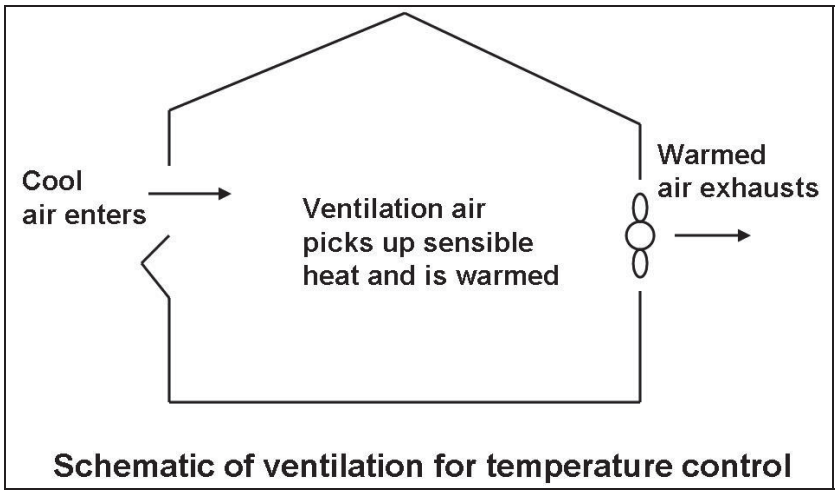
Figure 7.4 - Sensible heat sources and losses in a poultry house.





Through ventilation, cold or relatively cool, outdoor air is brought into the poultry house. Sensible heat produced within the building is transferred to the cool air and warms the air. This warm air is exhausted from the building and replaced with more cool outdoor air and the process is repeated. This process is illustrated in Figure 7.5. The amount of air exchanged to control temperature depends on the indoor and outdoor temperature difference, number and age of broilers housed, and building insulation level.

Figure 7.5 - Schematic of ventilation for temperature control.



If the sensible heat sources remain constant, reducing the amount of air exchange will raise the indoor air temperature. Increasing the air exchange will lower the indoor temperature. If the air exchange rate and sensible heat sources are kept constant the indoor temperature will shadow outdoor air temperature changes.

As broilers grow, so does the amount of sensible heat they produce. To remove the increased amount of sensible heat and maintain a constant indoor air temperature, the air exchange rate per broiler needs to increase as the birds grow.

Some sensible heat may be used to evaporate liquid water (i.e., spilled water, wet feces and spraying mists). In cold weather when sensible heat from the broilers and heaters is needed to maintain the desired indoor temperature, the heat used to evaporate spilled water is a loss, unavailable to heat the building. In hot weather when excess sensible heat is available sprinklers and evaporative cooling are used to help dissipate excess heat.

G. Air exchange for moisture control

Litter moisture and **indoor relative humidity** control is very important in poultry facilities. Wet litter can contribute to feet and leg problems and increased ammonia production. High relative humidities can contribute to condensation and frost on walls, ceilings and around the perimeter. The ***relationship between temperature and the air's moisture holding capacity*** of the outdoor and indoor temperatures play an important role in moisture control for air exchange. A key element of the relationship is that warmer air has a greater holding capacity (see Figure 7.6). This means that when the temperature difference between inside and outside is large the air has a larger capacity to remove moisture from the poultry house. When the temperature difference between inside and outside air is small, the air has a smaller capacity to remove moisture from the barn. As a rule of thumb***, the moisture holding capacity of saturate air doubles for every 20°F temperature rise***.

Air exchange achieved through ventilation is used to remove the moisture in respired air and excreted feces from the chickens. Ventilation must also remove water spilled or leaking from drinkers. **Moisture** sources and methods of removal are illustrated in Figure 7.7. As illustrated in Figure 7.8, relatively cool and dry outdoor air is brought into the poultry house. The air is warmed increasing the air's moisture holding capacity. Liquid water is evaporated. The evaporated water vapor and respired moisture from the chickens is absorbed into the air increasing its humidity ratio. The warm, moisture-laden air is exhausted from the building and replaced with more cool and dry outdoor air and the process is repeated.

In cold weather, to conserve heat, the **minimum air exchange** is often used. The minimum air exchange required must be sufficient to control moisture conditions in the poultry house. Much less outdoor air is needed in cold weather because of the large temperature and **moisture holding capacity** that occurs when the outdoor air is warmed. In spring and fall, the temperature difference between inside and outside is much smaller which means that there is much less of an increase in the air's moisture holding capacity. If the outdoor air is warm and moist (i.e., it has a high dew-point temperature and high humidity ratio) it is even harder to maintain litter moisture conditions.

Figure 7.6 - The relationship between temperature and water-holding capacity of air.

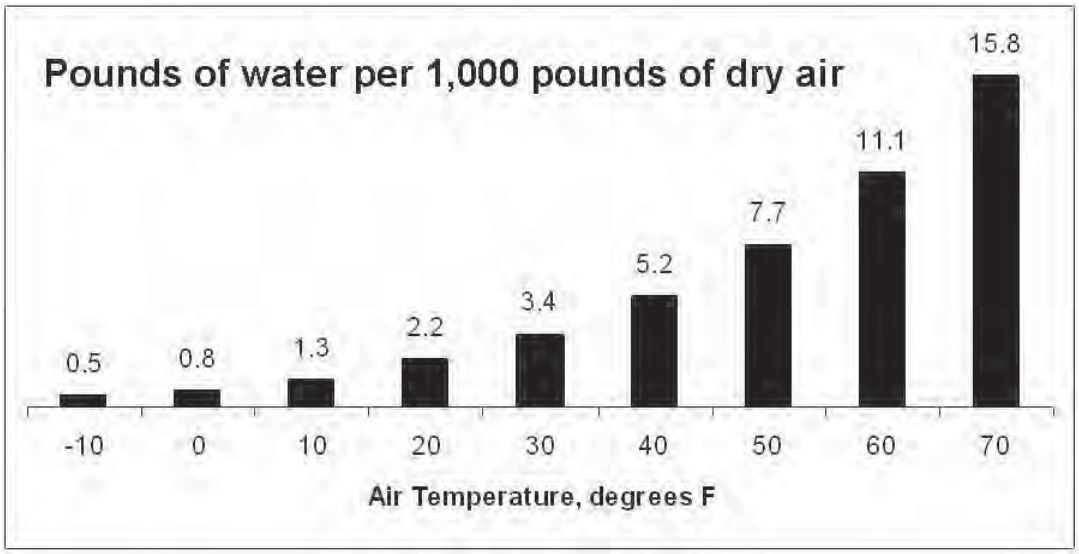


Figure 7.7 - Moisture sources and removal in poultry houses.

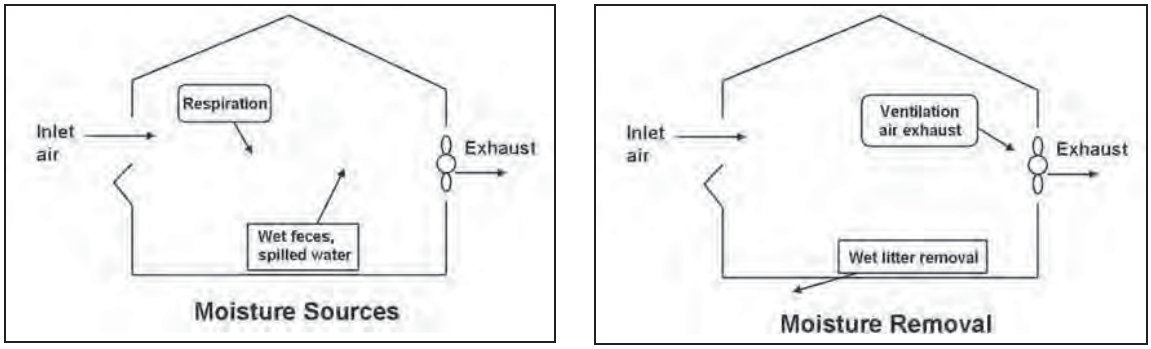
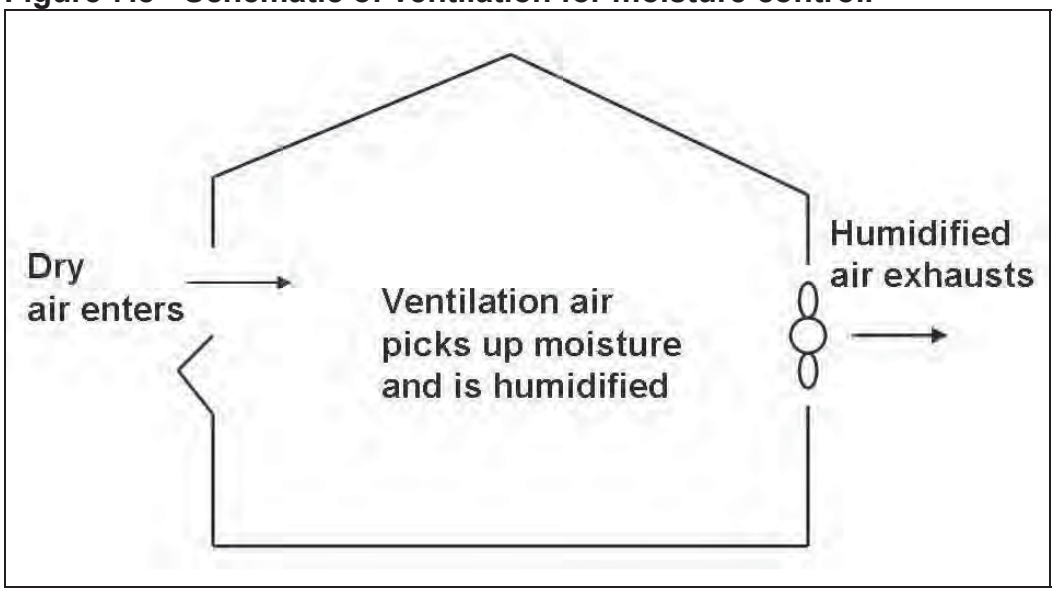


Figure 7.8 - Schematic of ventilation for moisture control.



In warm weather moisture control is fairly easy to accomplish because of the large moisture holding capacity of the warm air. In hot and humid weather, however, heat stress can be a problem because the broilers have a difficult time getting rid of their body heat. The air's high humidity ratio and dew-point temperature do not allow the broilers to lose much heat by evaporation in their respiratory system.

Ventilation is an important factor in **litter moisture control**. Ventilation air exchange is used to remove moisture produced within the building. Excessive air exchange can remove too much moisture and produce dry dusty conditions. Insufficient air exchange removes too little moisture and produces wet litter conditions. Litter dries faster when the air's moisture holding capacity (based on indoor conditions) is large and the outside air's humidity is low. This condition exists in cold weather when the outside air is heated when it enters the building.

H. Air velocity

Increased air velocity produces **a windchill** effect on broilers. The benefits arise from the increased convective heat loss with increasing air velocity. When evaluating the windchill effect in commercial production conditions, it should be kept in mind that air velocities around the broilers are approximately 50% lower than the air stream velocity in the open area of the house.

Caution is advised at air temperatures greater than 100°F. At these temperatures, increased wind speed actually causes a heat gain to the broilers and any heat loss from the broilers is almost entirely evaporative. ***When interior air temperatures are over 100°F, catastrophic broilers losses could result from operating 'cooling' fans without implementation of evaporative cooling***.

I. Ventilation system design

Ventilation is the exchange of air in a building with fresh air from outside. Heat, moisture, noxious gases, dust and microorganisms are produced in a broiler house as a result of bird metabolism, feeding and drinking activities, waste decomposition, and unvented heating units. Ventilation systems are designed to maintain air quality during cold weather and to regulate temperature during hot weather. Heating and cooling systems compliment ventilation to maintain a productive environment.

Ventilation rate, the amount of air exchanged in a given time, is usually expressed in CFM (cubic feet per minute) per bird or CFM per unit of body weight. It is also expressed as ACH (air changes per hour) which reflects a complete replacement of the building's air volume during a time period. Ventilation rate is designed to provide a uniform environment that is most suitable for economical poultry production. In practice, however, the environment in a poultry house is always in a transient state due to continuous changes in outside weather conditions; changes in moisture, heat, and manure production rates by birds; and the cycling of mechanical devices such as heaters, fans and feeders. Electronic sensors, environmental controllers and warning

systems are used by commercial producers to help ensure that the proper environment is maintained.

Ventilation has **two basic functions**: air exchange and air distribution. **Air exchange** may be summarized simply as the cycle of fresh air in, stale air out. **Air distribution** is the process of delivering fresh air to all animals and mixing fresh air with stale air prior to removal from the building. Inlets provide the primary means of controlling air distribution within the ventilation space. Controls for fans, inlets, ridge vents, and sidewall openings allow these components to function together to achieve the desired ventilation performance.

VENTILATION SYSTEM DESIGN VERSUS MANAGEMENT

Ventilation system design deals with sizing and selecting system components (i.e., heaters, inlets and fans) from the many kinds and sizes available. Design procedures consider extreme conditions to ensure that the selected ventilating system components can provide adequate ventilation and environmental control even during extreme weather. Ventilating principles are used for system design.

Ventilating system operation and management deals with day-to-day adjustments of the existing system components in response to current conditions (i.e., weather, bird numbers and age). Extreme conditions are seldom encountered. The focus is on efficient and effective environmental control that responds to changing conditions. It is important to understand ventilating fundamentals to better manage the ventilating system to provide the most appropriate and economical environment possible.

There are **two primary types of ventilation**, mechanical and natural. **Mechanical ventilation** uses fans to provide airflow (see Figure 7.9). **Natural ventilation** takes advantage of naturally occurring forces to move air in and out of the building (see Figure 7.10). In either type of ventilation, a pressure difference causes air to flow and provides the driving force for ventilation. In mechanical ventilation, a **static pressure** difference between the poultry building interior and the outside is monitored to assure proper air exchange and air distribution. A combined or hybrid system uses both mechanical and natural ventilation.

Figure 7.9 - Schematic of a mechanically ventilated building and its components

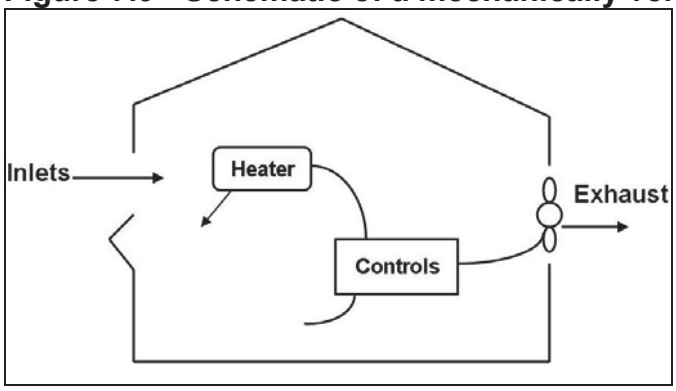
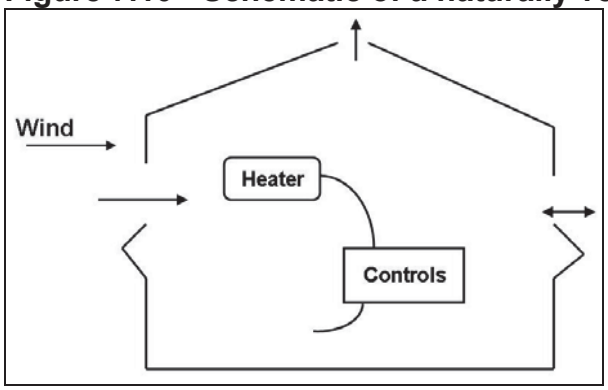


Figure 7.10 - Schematic of a naturally ventilated building and its components.



The **design criteria** for ventilation rates to maintain acceptable indoor air quality are based on moisture removal. **Minimum ventilation rates** for cold weather are commonly based on air exchange rates that will keep moisture removal balanced with moisture production. It is generally assumed that with proper moisture regulation inside the building, other air components such as dust, ammonia, and carbon dioxide will also be in control. However, with increased interest in improving the economy of production and the conservation of energy, ventilation rates are often reduced to the point that contaminants are a problem. To keep aerial ammonia below the recommended threshold of 25 ppm (parts per million) when old litter is used, ***the minimum ventilation rate needs to be up to nine times the recommended minimum ventilation rate***. The higher ventilation rate results in more heat lost in exhausted air and higher supplemental heating costs. Failure to provide a higher ventilation rate will result in poor bird performance due to high ammonia levels. Clearly, air quality, management practices (such as the use of built up litter), and bird productivity are interrelated components of successfully poultry production. (For more information see chapter on Cold Weather Ventilation).

As building air temperature increases or decreases from the desired inside temperature, the ventilation system, and perhaps heating or cooling, are activated in order to maintain the target temperatures. For example, during hot weather, once the minimum ventilation capacity is reached, the building temperature begins to rise approximately linearly with further increase in outside air temperature. At some point (at which the temperature considered stressful for the birds), cooling mechanisms such as evaporative cooling and tunnel ventilation may be activated.

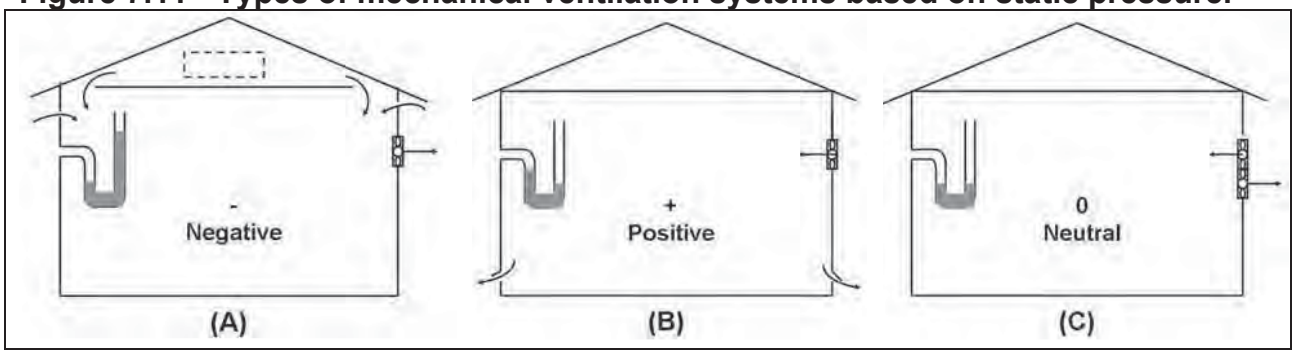
The relationship between poultry production efficiency and building environment is complex. Further complications arise from the costs associated with maintaining an optimal environment for the bird. Costs are usually proportional to the difference between the desired poultry building environment, on the one hand, and, on the other, the outside air conditions plus the quantity of air contaminants inside the building. It is in the grower's economic interest to provide the best possible environment for the bird. In fact, most poultry production was moved indoors to provide an optimal year-round environment for birds and workers while benefiting from labor and mechanization efficiencies.

The required ventilation rates for cold, mild or hot weather will be described in future chapters. The entire range of seasonal airflow needs must be integrated into a ventilation strategy based on daily conditions. One solution to variability among seasonal needs is to use single-speed fans that are 'staged.' Another is to use variable-speed fans.

J. Mechanical ventilation systems

Fans are the heart of a mechanical ventilation system. Properly operating fans create an air pressure difference between the inside and outside. This air pressure difference, known as **static pressure**, causes the air flow that produces the air exchange required as part of a mechanically ventilated poultry house.

Figure 7.11 - Types of mechanical ventilation systems based on static pressure.



The most common system is shown graphically in Figure 7.11A, The exhaust fan(s) create a slight **negative pressure** or vacuum in the poultry house, which causes air to enter the barn through the designed inlets.

Positive pressure systems (Figure 7.11B) do the opposite. Fans blow air into the barn creating a **positive pressure** and air escapes through designed outlets. This system is fairly uncommon, since it often causes building materials to deteriorate because moisture moves through the cracks in the building.

A third system is a **neutral pressure** or push-pull system, shown in Figure 7.11C. Push-pull systems operate under neutral pressure at continuous or cold weather ventilating rates. A neutral pressure system has both an exhaust fan and an inlet fan, which create a zero or approximate neutral pressure difference between the inside and outside. Such a system typically becomes a negative pressure system when other larger exhaust fans operate during warmer weather.

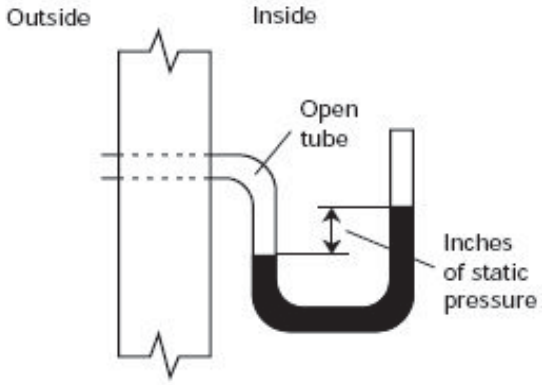
Mechanical ventilation systems consist of four major components. They are: **fans**, **openings**, **heaters**, and **controls**. Fans and openings control the amount of air exchange in a mechanical ventilation system. The openings also have an impact on the air distribution and mixing in a mechanically ventilated poultry barn. Heaters provide supplemental heat to maintain desired indoor temperatures during cold weather and when chickens are too small or young to produce enough heat to keep the poultry house warm. Controls are needed to adjust ventilating rates (fan controls), supplemental

heating rates, and the air velocity rates (fan controls), supplemental heating rates, and the air velocity through openings as weather, bird age and size change.

The term **static pressure** means the difference between the air pressure inside and outside the building. It is easy to measure this pressure – and knowing it is necessary when you select a fan and adjust inlets

Static pressure is usually expressed as ***inches of water column*** (IWG). Static pressure or air pressure difference is usually measured between the inside and outside of a building with a **manometer** and is expressed in inches of water column (see below).

Figure 7.12 - Manometer used to determine building static pressure.



The above figure shows a simple manometer, a section of clear plastic tubing partially full of water bent into a 'U' shape. You can place this U-tube inside or outside the building. Note, however, that you always expose one end of the tube to the outside air pressure and the other to the inside conditions.

You can make a manometer with a piece of tubing, as shown above, or buy one from a fan supplier.

Fans

Fans are used in mechanical ventilating systems to supply the energy needed to exchange the desired amount of air in a poultry house each minute. In a negative pressure system, fans are installed to exhaust stale or used air from the building and bring in fresh, clean air. It is very important to use only rated fans. Fan ratings are given in **cubic feet of air per minute** (CFM), or in SI units, cubic meters of air per hour, at specific static pressure levels.

Fan staging is an effective ventilation management tool. Single-speed fans can be staged to regulate ventilation airflow from minimum to maximum rates needed during the year. One or more fans can be used to provide the minimum required rate for winter moisture and ammonia control. As the outside temperature rises during mild weather, more fans are needed for both air exchange and temperature control. **Minimum ventilation** would be considered stage one, the next fan(s) turned on would be stage

two, the third fan(s) stage three, and so on. Three major decisions are needed in order to stage a set of fans: 1) the number of stages needed; 2) the set point temperatures that will activate each stage; and 3) the magnitude of airflow needed at each stage. Set points temperatures and airflow provided in each stage must match the air exchange and temperature control requirements for the bird's comfort and productivity.

There should be sufficient ventilation stages so that transitions from stage to stage do not result in large indoor temperature swings. A practical minimum is at least four stages, but more than six ventilation stages will not result in significantly better environmental control. The minimum and maximum stages' airflow capacities should be based on minimum winter ventilation and maximum hot weather cooling needs, respectively. Intermediate stages would be specified based on the volume of desired airflow change. Ideally, the beginning stages, which are primarily used during cool weather, should have small steps between set point temperatures to avoid chilling the birds with rapid changes in cold airflow. Later stages should have larger differences between set point temperatures, since large volumes of airflow are needed to provide hot weather temperature control. In practice, however, using equal divisions of outdoor temperature as temperature set points between stages has been found adequate.

Variable-speed fans have the advantage of continuous variation between their minimum and maximum ventilation rates. Smooth airflow changes ***reduce temperature swings*** that can occur with staged, on-off fan control. When properly sized and controlled, variable-speed fans can reduce building energy costs. Variable-speed fans are direct-drive, and motor voltage varies the ***revolutions per minute*** (RPM) of the fan blade, thus modifying the airflow rate. When operated at low speeds, however, variable-speed fans have the disadvantage of losing their ability to resist wind-induced back-pressure on the fan.

Openings

The functions of **air inlets** are to provide fresh air throughout the building, control direction of airflow, and maintain sufficient inlet air velocity. The ventilation requirements within a poultry house change based on the number of broilers, stage of growth, and time of year. With good ventilation system design and management, including inlet design and control, conditions in the poultry house can be maintained within the broiler's comfort zone.

Air inlets for negative-pressure ventilation systems in poultry housing include continuous slots and discrete box or area inlets. **Continuous slot inlets** have a rigid, movable baffle for controlling the size of the opening. **Bottom-hinged baffles** are preferred. Good inlets are easily adjusted so that as conditions change the inlet size can be changed. Continuous inlets may be positioned along both eaves. Tunnel ventilation requires a separate set of inlets.

Attics provide good wind protection for continuous slot ceiling inlets. During hot weather, fresh air should be provided directly from the outside and not from the attic, unless the roof is well-insulated. Large volumes of air such as during summer ventilation can pass through a well-insulated attic with little temperature gain. Roof insulation reduces sun warming of the attic and is required if using attic ventilation in hot weather.

Unplanned inlets include large openings such as doors, windows, and fans without shutters, which are not originally designed to be part of the ventilation system. Other, often overlooked, unplanned inlets including openings for manure handling or for feed and egg conveyors. *Even small openings, such as cracks in the structure and around doors, windows, and fans, can cause drafts and poor control of air distribution*. Tight buildings, those that minimize unplanned inlets, allow the ventilation system to bring in air through carefully designed and placed inlets for more control over ventilation air distribution.

Air leaves the inlets as an **air jet**, a region of air moving faster than surrounding air. Jet velocity is primarily determined by the static pressure difference across the inlet and inlet opening cross-sectional area. Desirable velocity is 700 to 1,000 feet per minute. The center of the jet continues to move at the velocity at which it entered the house while outer edges of the jet are slowed by friction and turbulent mixing with surrounding air. The jet is dissipated when its velocity slows to less than 50 feet per minute. Air is considered still when the velocity is less than 50 feet per minute.

An air jet issued from an inlet opening has a tendency to grow in size and slow down as it mixes with room air. Air jets are classified into two types, free jets and wall jets. A free jet travels unconstrained by surfaces such as walls or ceilings. A wall jet is released adjacent to a ceiling or wall and mixes with air only on its free side. Wall jets ‘throw’ air further across a room than free jets under similar conditions. Free jets provide more vigorous mixing of incoming air with room air.

Air jet speeds of 700 to 1,000 feet per minute provide for air mixing and air distribution, or throw. When an inlet is adjusted correctly, high velocity cool air sweeps the ceiling and mixes with warm air in the building. When an air inlet is open too wide a slow moving stream of cool air sinks to the floor without mixing with warm room air and causes drafts.

Inlet configuration can be used to attain varying air distribution goals during the year. **Bottom hinged baffles** partially opened direct air across the ceiling during cold weather. This reduces drafts which are especially important for young birds and results in improved cold air mixing. During hot weather, the inlets can be opened further to direct the air jet towards the birds to increase convective cooling. Sections of **continuous eave inlets** can be closed during hot weather to force air through evaporative cooling pads. Notched boards installed above curtains can provide cold weather ventilation since continuous narrow openings at the top of the curtain often do not direct air properly. Changing the inlet size, inlet configuration, or the type of inlet allows the grower to accommodate winter and summer ventilation needs.

Inlet placement is an important factor to consider. Inlets are most often positioned high in the structure, such as the eave juncture of sidewall and ceiling, to allow incoming air to mix with room air before dropping into the bird-occupied area. Since air is needed in all parts of the building it is necessary to have either inlets in all parts of the building or a distribution mechanism to move air to places where there are no inlets. Two methods commonly used in negative pressure systems are to provide inlets around most of the building perimeter and to create a continuous slot opening in the ceiling along the length

of the building. If the system was not designed properly, circulation fans may be used to improve distribution.

For buildings up to 40 feet wide, **continuous-slot inlets** should be placed at the eaves along both sidewalls. For wider buildings, one or more **interior ceiling slot inlets** should be added. These recommendations are based on the estimate that an air jet issuing from a slot inlet at 700 – 1,000 feet per minute will throw air about 200 feet to the center of the building. Wider buildings will surfer from inadequate air distribution without additional inlets in the building center.

The maximum distance between a fan and inlet should be limited to 75 feet. Air traveling more than 75 feet through high-density poultry housing is dirty enough to be discharged, particularly during cold weather. When tunnel-ventilation systems are operating in hot weather, it is rare that the distance between a fan and an inlet is less than 75 feet. However, air is generally quite clean in tunnel-ventilated houses because of the large amount of air flow. During cold weather, close any inlets within eight feet of fans to prevent air from short-circuiting out the fan.

Inlets may be closed in sections, or boxes used so that optimal slot opening and air distribution can be effectively controlled. **Box inlets**, which are spaced rather than continuous, can provide control over air distribution as bird environment needs changes. Some buildings have sections which are not used for part of a production cycle, such as during partial-house brooding of broiler chickens. In such buildings, only the populated half of the house has functional inlets. Many broiler houses have box inlets that are four to six feet long and eight feet apart along both sidewalls, or in the ceiling, at the eaves. Curtain-sided house inlets run along the entire length of each sidewall. A notched board along the top may be used to provide small, intermittent inlet openings at the top of the curtain during cold weather.

Inlet area is another factor that must be considered in designing a ventilation system. The maximum cross-sectional area of inlets should be sized for the maximum capacity of fans. Provide at least 1.7 square foot of inlet per 1,000 CFM of fan capacity for air exchange. Other ways to express this are one square foot of inlet area per 600 CFM fan capacity or one square inch of inlet area per four CFM. For continuous slotted inlets, providing two square feet per 1,000 CFM is recommended.

A smaller than recommended inlet creates a faster inlet jet velocity but increases resistance to airflow, which can overload fans. Larger inlets allow air speed to slow below desirable levels, and this causes drafts and dead air zones in the building when air is not mixed and distributed properly. When air flows through most openings, the cross-section area of the air jet is reduced to 60-80% of the total free area of the opening.

Inlet opening control is required to adjust to changes in the outside environment to adapt to the required changes in ventilation rates. Since interior and outside environmental conditions change over the course of a day or a season, the size of inlet openings and fan exhaust rates will also change to provide for good air distribution. **Automatically controlled inlets** are recommended because the opening area can be changed as the ventilation rate changes to maintain a relatively constant static pressure.

Inlet opening size is adjusted each time the fan exhaust rate changes to roughly maintain the 1.7 square feet of inlet area per 1,000 CFM ratio.

At a given **static pressure**, the airflow rate through an inlet is proportional to the opening area. A controller that uses a **manometer** to measure static pressure and maintain about 0.04 IWG can be used to control inlet size if adjustments can be made with a winch and cable system. Static pressure control is important to maintain the desired airflow rate. Airflow is about 600 CFM per square foot of inlet area at 0.04 inches of static pressure. Airflow is doubled at 0.125 inches of static pressure.

For a **slot inlet**, the slot width opening is adjusted, so the inlet width is proportional to airflow rate. Continuous slot inlets can be difficult to control at the very low airflow rates required in cold weather and thus may result in poor air distribution and harmful drafts. Slot openings of less than ¼ inch are not practical to maintain due to common construction irregularities. One solution is to close every other inlet section during cold weather with remaining sections providing more opening cross-sectional area. This allows half the inlets to be open ½ inch rather than trying to keep all the inlets open ¼ inch.

Passive automatic inlets have gravity shutters, counterweighted baffles, or spring-loaded baffles that open and close the inlets in response to static pressure changes. These inlets employ free-swinging, top-hinged baffles that move in response to static pressure differences and airflow. These are not often used in poultry houses.

Manually controlled inlets need to be adjusted frequently and are therefore rarely used in commercial poultry production. Most inlet systems use mechanical controllers to adjust the opening automatically and maintain a relatively constant static pressure.

Restrictions to airflow on either side of the inlet should be avoided. The opening at the baffle is usually the smallest airflow area of the inlet and is referred to as the control point. The size and configuration of this opening determines the direction and velocity of the air jet. Restrictions upstream of this point will cause an undesirable resistance to airflow, lower air speed.

Upstream inlet restrictions are fairly common in poultry house construction and should be eliminated. The area upstream from the control point should provide an airflow path that is at least two times larger than the cross sectional area of the control point. If center-ceiling inlets are used, upstream restrictions include **inlet vents to attic areas**. The soffit openings, gable louvers, and/or ridge vents, should be sized to be at least twice the maximum area of inlets from the attic to the bird area. Screen the intake at the building exterior with ¾ inch hardware cloth or bird netting. More restrictive window screening or residential-type soffit vents (also known as under-eave vents) with pinholes or slots will drastically reduce airflow. Within the house, obstructions larger than ½ the jet thickness can prematurely deflect air jets downward. Even ribbed ceiling sheeting oriented perpendicular to a thin slot-inlet air jet can deflect the jet. Other common obstructions include lighting fixtures, conduit, augers, piping, and structural members.

Tunnel inlet openings are placed on the opposite end of the building from the exhaust fans. They are very large inlets often positioned in both sidewalls, rather than the end

wall (due to construction practices). In houses without pads, the inlets must be sized so that the inlet air velocity is low enough (no more than 900 feet per minute) so that the inlet does not cause a large restriction and the associated static pressure drop. Tunnel ventilation is often operated at relatively low static pressure differences (0.02 to 0.05 inches in a water gauge) in order to maximize fan output. In addition, the inlet velocity for air mixing and throw is accomplished at lower air speed than for conventional baffle inlets due to the large mass of incoming air.

When tunnel inlet openings are not in the end wall, try to achieve a high enough inlet air velocity (500 to 900 feet per minute) to provide some cooling to the birds near the end wall. Too slow an inlet air speed will not 'throw' the inlet air over the birds and will create a dead air space near the end wall. However, if the static pressure exceeds 0.08 inches of water, fan output is reduced and air entering through sidewall inlets may form dead air spaces next to the inlet openings.

Tunnel inlet size is almost directly proportional to the buildings cross sectional area. Indeed, if air is brought straight into the house through the end wall and then out the opposite end wall fans, the inlet area would be almost equal to the house cross sectional area. With sidewall tunnel inlets, the opening is from 1.1 – 2.0 ft^2 of opening per 1,000 CFM of fan capacity. The lower value of 1.1 ft^2 per 1,000 CFM will provide the higher limit of air speed of 900 feet per minute while the 2.0 ft^2 per 1,000 CFM delivers air at 500 feet per minute.

For example, a tunnel ventilated house with 180,000 CFM total exhaust capacity would require from 200 – 360 ft^2. of inlet area divided between the two sidewalls. With a curtain on the tunnel inlet openings, the opening size may be adjusted to match the number of tunnel fans running. An upper value of 2.5 ft^2 per 1,000 CFM (entering at the desirable 400 feet per minute) would be suitable for inlets coming in the end wall and traveling straight down the house with no need to throw the air across the house width. With any of these inlets, due to their large size, wind effects at the inlet end of the tunnel ventilated houses may be the predominant force moving air in that part of the house. It is often 20-30 feet down the house from the inlets that the classic tunnel airflow pattern is established on a windy day.

K. Natural ventilation systems

Natural ventilation, as the name implies, is a system using natural forces to supply a building with fresh air. Air exchange is accomplished through designed inlets and outlets in a building. It is important to recognize that naturally and mechanically ventilated buildings operate under different principles. Mechanically ventilated buildings use fans to exchange air, which can be controlled to provide the desired air exchange rate. Thermal buoyancy and wind are both dependent on uncontrollable weather. This makes natural ventilation control different.

Natural ventilation is an attractive management technique because fan and fan maintenance expenses are eliminated. The roof design, the design of major openings for ventilation, building orientation, the occupants, and finally the outside water are all factors influencing the results of the ventilation process. Openings located along the

sidewalls are termed '**sidewall openings**', and the opening at the roof peak, or ridge, is called the '**ridge opening**.' Variation exists in the shape of the interior roof itself due to slope and style and these in turn can influence the 'chimney' effect that develops in the building. The occupants (poultry in this case) also influence the performance of naturally ventilated buildings. Bird age and population density affect the response of a building to ventilation changes as well as fresh air distribution in the building. The simultaneous effects of all these components determine the success of naturally ventilated buildings.

Proper ventilation of naturally ventilated buildings requires that the sidewall and ridge openings work in harmony to deliver and distribute the required fresh air to the building. Both high and low openings are needed in naturally ventilated buildings. At least two openings on opposite sides or ends of the buildings are needed for air distribution within the structure and to avoid short-circuiting of airflow. Providing proper distribution of fresh air within the building is frequently neglected, and this can cause many problems. For example, if the building is managed in such a way that all the fresh air passes through the sidewall opening and is 'short-circuited' to the ridge opening, then the fresh air provides very little benefit to the birds. Another common mistake is to attempt to ventilate with only one opening, as through one sidewall curtain, which does little to promote internal air distribution. It is essential that naturally ventilated buildings adhere to sound fresh air distribution principles.

Comparing naturally to mechanically ventilated buildings

Advantages	**Disadvantages**
Lower cost	More challenging to control
Lower maintenance	Periodic replacement of opening coverings
Lower electrical use	Rain/snow/sun entrance to building
	Large building 'footprint'

Several key advantages and disadvantages of naturally ventilated buildings compared to mechanically ventilated buildings are listed below. The initial high cost of fans along with the elimination of fan operating expenses makes natural ventilation an attractive option.

It is more difficult to consistently achieve the desired house environment with natural ventilation. Rapid changes in **wind speed**, **wind direction**, and **outside temperature** require that sidewall and ridge openings be constantly changed to ensure adequate fresh air exchange rates and proper fresh air distribution within the building. If an inlet controller cannot properly adjust openings in response to weather changes, then extreme fluctuations of inside temperature, humidity or ammonia level will occur. An intelligent inlet controller responds effectively to weather influences and can drastically reduce this disadvantage usually associated with naturally ventilated buildings.

Orientation and building 'footprint' dimensions have to be carefully planned for naturally ventilated buildings. It is extremely important to orient the building so that it is exposed to prevailing winds during the hottest part of the year. If a naturally ventilated building is improperly oriented relative to warm-weather winds, the building will be under ventilated, resulting in inside temperature and humidity levels outside the bird comfort zone.

Naturally ventilated buildings require more land space, which includes surrounding free space, in order to take advantage of warm weather winds. The building itself may be no

larger than a mechanically ventilated house, but a requirement for unobstructed airflow near and around the building rules out close siting to other structures. Obstructions such as building, trees, and other large, wind-deflecting obstacles affect wind patterns and reduce wind energy available for ventilating a building. Precautions must be taken during planning and construction to adhere to both orientation and physical spacing guidelines.

Wind induced and buoyancy induced pressure forces

Naturally ventilated buildings deliver fresh air to the birds through two basic forces: wind induced and buoyancy induced pressure forces. As illustrated in Figure 7.13, **wind induced ventilation** is the processes by which wind, acting on a building, will pressurize openings relative to the building's inside and thereby induce fresh airflow through the building. **Buoyancy-induced ventilation** is oftentimes referred to as the 'chimney-effect' or 'thermal buoyancy.' As illustrated in Figure 7.14, the basic principle is that hot air rises. Openings positioned low and high in a structure are particularly important to this process. Housed poultry release a great deal of heat resulting in increased temperatures around the bird. Warmed air will rise, and with properly designed ridge openings, this rising air will escape from the building. As heated air escapes, fresh outside air will replace it through sidewall openings.

In cold weather conditions, when a naturally ventilated building's openings are nearly closed, buoyancy-induced ventilation is often the primary mechanism of air exchange. With any wind acting on the structure, wind forces will quickly override buoyancy effects. In warm weather conditions with more sidewall and ridge area open on the building, wind-induced ventilation becomes the primary mechanism for ventilation. In regions where extreme heat and cold exist throughout the year, both wind and buoyancy-induced ventilation operate to deliver required fresh air to the birds.

Wind acting on an opening differences in pressure across the opening, which forces air to flow through it. The buoyancy effect is dependent on a temperature difference between warm inside and cooler outside ambient conditions. The height difference between inlet and outlet also contributes to airflow.

Figure 7.13 - Wind induced natural ventilation.

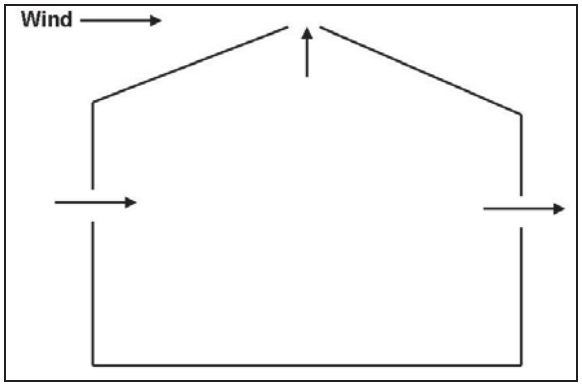
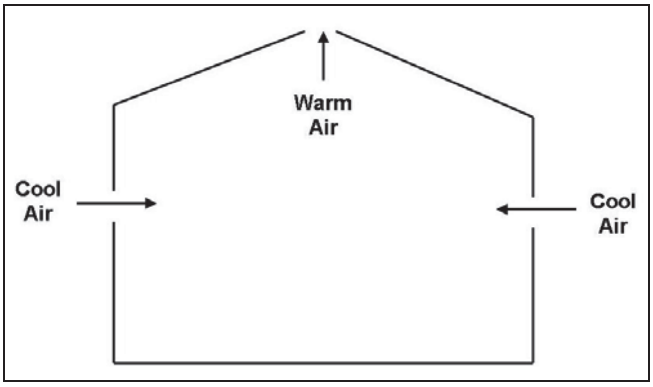


Figure 7.14 - Thermal buoyancy induced natural ventilation.



The relative importance of wind acting directly on an opening may be either an advantage or a disadvantage, depending on the time of year. During warm weather conditions wind becomes an advantage and techniques are used to take full advantage of the prevailing wind direction. During cold and mild weather conditions, relatively high wind speed can function as a serious disadvantage. During cold weather periods, the goal is to ventilate the building at minimum rates for controlling moisture and noxious gas levels. If sidewall openings are left too far open, do not seal tightly, or are torn, infiltration from wind can be substantial, resulting in uncontrolled drafty conditions and, potentially, excessive use of supplemental heat.

Wind also affects the rate of air flow through the ridge opening. Wind blowing over the ridge opening reduces pressure at the opening. This suction force draws air out of the ridge vent.

Ventilation requirements

The ventilation requirements for naturally ventilated buildings are expressed in terms of the fresh air exchange rate. The fresh air exchange rate defines the number of times the volume of air in the building is replaced. If we concern ourselves with the volume (sidewall height x building width x building length), then the ventilation system must replace this inside air with fresh air over a specified period of time.

The **maximum ventilation rate** requires a compromise in design. As outside temperature increases, required fresh air exchange rates for controlling temperature increases rapidly. In fact, without evaporative cooling, the inside temperature will always be higher than the outside temperature, a concept that is often misunderstood.

Naturally ventilated building design

During warm and hot weather periods, naturally ventilated buildings rely almost completely on wind to generate the required fresh air movement through the building. Building orientation is best determined using local wind patterns. To take advantage of warm weather winds, the building ridge axis should be perpendicular to the prevailing warm weather winds. In lieu of localized wind patterns, ‘wind roses’ can be used to position naturally ventilated buildings so as to take advantage of warm weather winds. Wind roses are the summaries of wind patterns and wind speeds for various weather stations across the U.S. Since winds generally shift between seasons of the year, it is important that patterns for summer winds be selected. The percent time of calm days is a very important parameter in relation to naturally ventilated buildings. Significant periods of calm days combined with warm temperatures result in inadequate fresh air entering the building and an unacceptable increase of inside temperature.

Sidewall and ridge openings

Any single opening in a naturally ventilated building, acting alone, will behave as both an inlet and an exhaust. If an opening should behave as an inlet, adequate openings must be provided to behave as exhaust points, and vice versa. The naturally ventilated building thus ‘breathes’ to maintain pressure forces at levels consistent with exterior pressure acting on the building.

A properly designed naturally ventilated building provides **opening sizes** that maximize airflow through the building during periods of extreme heat. To accommodate periods of cold weather, opening sizes need to be adjusted quickly and appropriately to control the quantity of outside air entering the building.

In general, the **ridge opening** needs to accommodate a low wind condition during periods where mild weather ventilation rates (about 15 air exchanges per hour). During warm and hot weather conditions, the usefulness of the ridge opening for ventilation is very limited because the buoyancy effect is low due to similar indoor and outdoor temperatures. Some have argued that the ridge opening is unnecessary for this reason. In cold weather, however, the ridge opening is often the primary mechanism for moving fresh air through the building. The ridge opening in cold weather can be thought of as the exhaust fan for moving air with inlets occurring along the sidewalls. Even during warm weather when little wind is present, the ridge performs an important function in allowing state warm air to rise up out of the building. The ridge also provides a high opening on which the wind can act. Because the wind blows faster higher off the ground, there is a benefit from enhanced wind suction ventilation at the ridge.

In contrast to sidewall openings, the **ridge opening size** is usually not adjustable. Generally, it is not necessary to control the ridge opening. Although the ridge opening usually remains open year-round without adjustment, some control is possible with internal panels or a pipe that partially covers the ridge opening. The ridge opening should never be completely sealed, and any ridge opening baffle should allow air exchange, even when the baffle is in its closed position.

The above discussion of the sizing of ridge opening assumed that the ridge opening was a completely clear, unobstructed opening. Often, however, **barriers** designed to prevent snow and rain from entering the building are designed into ridge vents. Such barriers also have the unwanted effect of reducing the effective opening size or airflow path. The influence of barriers on airflow capacity can be substantial. A ¾ inch screen or bird netting will not obstruct airflow through a ridge opening. However, substantial reductions in airflow result from diversions placed as a component of the ridge. The common practice of placing a ridge-cap, for example, has been shown to significantly reduce airflow capacity; often by 50%. **Ridge caps** must provide enough space under the cap to allow free air movement. A better approach than ridge caps, one that minimizes airflow obstruction, is to place a trough under the ridge opening. Slope the trough at ¼ inch per foot and provide a drainage discharge. When placing the trough, minimize any obstruction effects by making sure that the total opening between the interior roof line and the trough edge is at least twice the full ridge opening.

An undersized ridge opening can be improved by the use of **upstands** which accelerate wind speed at the ridge allowing for higher suction forces at the opening. For example, a 6-inch wide ridge opening with a 6-inch vertical upstand will have quadrupled the airflow capacity of a simple ridge opening of that size. Therefore, an undersized ridge opening can be improved by incorporating upstands. Some ridge vent baffles, used to control ridge opening size, also open to the outside in a way that provides a ‘built-in’ upstand; an added benefit rarely recognized.

Curtains

Sidewall opening size is commonly adjusted using moveable curtains. **Cables** and **drop cords**, along with an **automated winch** assembly, can provide the needed adjustment of curtain openings. Sidewall curtains open from the top down, so that with the smallest opening, cold, fresh air enters at about an 8-foot height. Suppliers often hem the material with a pocket at the top sized to accommodate a standard 1¼ inch outer diameter curtain rod or a 2¼ inch outer diameter rod. A bottom hem can be provided at an additional cost. Good pocket construction includes double stitching of a folded under hem to prevent fraying and tearing.

Flexible curtains come in a variety of types and insulating values. Ultraviolet (UV) light resistance of the material is essential for poultry house curtains as they will be exposed to sunlight. Thicker materials or higher thread counts are typically stronger and usually cost more. Often multiple layers of materials are laminated together into a single curtain for enhanced wind and water resistance. Single- and multiple- layer curtains woven from polyester or polyethylene are common. Vinyl curtains will often crack in cold conditions. Some fiberfill curtains are available, but these can be difficult to fold during periods where maximum sidewall opening is needed. Clear, white, blue, and black-out curtain colors provide a range of levels of light transmission. Some curtains have a reflective covering.

In 'insulating curtains,' multiple layers of fabric are sewn together in order to trap a small insulating air space between each layer. Such insulating curtains do not provide significant insulating value. For example, a single-layer curtain has an R-value of roughly R-1, and multilayer curtains provide very little additional insulating value at R-3 or R-4. One insulated curtain with seven layers of material has an R-3 rating, which can be compressed down to about $1/10^{th}$ inch. Multilayer curtains can be beneficial though, especially in regions where cold weather infiltration is a problem. Multilayer curtains tend to reduce excessive cold air infiltration is a problem. Multiplayer curtains tend to reduce excessive cold air infiltration and ultimately uncontrolled, drafty exchange of cold outside air that necessitates supplemental heating. Insulating curtains also provide some protection from the surface condensation that is likely to occur on uninsulated curtains. The problems created by dripping water, which may pool and freeze near the bottom of the uninsulated curtain, must be compared to the advantages of more daylight transmission provided by uninsulated curtains. Air leakage can be a significant problem during cold weather when ice forms along the bottom of the curtain, pushing the bottom of the curtain away from the side of the house. For curtains which are permanently anchored at the bottom (not 'double-hung'), install a wooden strip to prevent this air leakage and pooling of condensation. The strip should extend an inch or so above the bottom of the sidewall curtain opening to eliminate any pocket where shavings and water can accumulate.

One type of curtain material popular is poultry houses because of its low cost is a 4½ ounce clear or blue polyethylene fabric. This is among the lightest weight fabrics. Heavier 6 - 7½ ounce fabrics have an expected life of five to eight years. The lighter weight fabric is less strong, but with good care it should also last this long.

Curtains are susceptible to several types of damage and need to be replaced periodically. Their **useful life** is dependent on such factors as regional storm frequency or high wind exposure, fabric durability, and rodent populations surrounding the building. Some curtain material may rot and mildew from prolonged high humidity. Moisture from rain and damp barn air can corrode light metal or rot unprotected wooden components. Poultry houses often contain elevated ammonia levels, yet plated hardware is often sufficiently durable. Stainless steel hardware is used in highly corrosive environments, such as swine buildings. Replacement is usually needed, not because the curtain degrades, but because it has been torn by strong winds or heavy storms. Unsupported fabric will flap and tear sooner and unrepaired tears will make replacement necessary sooner. Tears can easily be repaired with tape chosen to match the fabric type and applied to both sides of the tear.

Components may be added to the curtain system to prolong curtain life. **Double-hung curtains**, those with rods at top and bottom, can be stored at the top of the sidewall opening space during prolonged hot weather. Such curtains can be fully lowered and disengaged from bottom rod fasteners. Top and bottom rods can then be bundled together with curtain material and the whole assembly raised and secured to the top of the opening for storage. Storing curtains at the top of the wall protects them from poultry, rodents, machinery, litter, weeds, water, and dirt. An additional protective measure is to *unfurl curtains periodically during summer storage months to discharge water and dirt and to dislodge any nesting rodents and birds*. Curbs and bump rails should be provided to keep tractors and equipment away from the curtain walls. Bottom brackets will hold the folded-down curtain and provide a rope attachment point to prevent billows. Curtain clips secure the drop cords to the top curtain rod without piercing the fabric.

Because winds blowing against curtain exert a lot of force, curtains that are allowed to flap around in the breeze can quickly be torn. To prevent such damage, curtains need to be supported and securely anchored both on the inside and outside. On the building interior, curtains can be given extra support form the wind effects by closely-spaced (4-foot) building studs, open mesh screening (bird netting, for example), or support ropes or straps. In poultry housing, bird netting is most often employed. Materials that are not UV-resistant will soon deteriorate.

Exterior curtain support prevents **billowing**. Curtain straps or support ropes are the most common choice in poultry housing. Anti-billow rope is laced through fasteners spaced every two feet, alternating form top to bottom of the curtain to form a continuous V-shaped support. Polypropylene rope is inexpensive and has UV inhibitors, which make it well-suited to this function. Curtain strapping is often polypropylene around 2-3 inches wide and is UV resistant. Strapping should be spaced no more than 5 feet apart down the length of the house, vertically over the curtain installation.

Steel cable is most often used to move curtains in sections that may be 100 – 200 feet long. Hand winches or automatic curtain machines are used to move the cable, which runs the entire length of the curtain section. **Drop cords** attached to the cable operate through a fixed pullet for raising and lowering the curtain. Pulleys are positioned every 4-6 feet along the curtain with drop cords of polyester rope. Polyester rope has a lower elongation factor than other common ropes for less stretch.

Winches, cables, and pulleys used to move the drop cords must be rugged. Consider how often you will be adjusting curtains when choosing operating methods and hardware. In the process of changing the direction of the cable, the pulley is also bending that cable. A curtain may be adjusted hundreds of times a day. On a five-minute timer, curtains or inlets will be opened 288 times per day and closed another 288 times per day. Sections of cable are being bent thousands of times per month. How much the pulley affects cable life is largely dependent on the pulley diameter. Larger pulleys bend the cable less; doubling the pulley diameter can increase cable life up to thirteen times. A second benefit of larger-diameter pulleys is a decreased likelihood that the cable will slide over the pulley surface, which leads to excessive wear and eventual breakage. It is important, however, that pulleys and cables be properly matched, since the type and size of the cable determine pulley diameter to minimize wear. Smaller-diameter cables require smaller-diameter pulleys. Whether the cable slides over the surface or turns the pulley is a function of surface area against which the cable acts on the pulley. Most steel cable breaks are due, not to insufficient cable strength, but to improper matching of cables to pulleys. Manufacturers have found that many cable breaks are caused by insufficient cable-to-pulley surface contact.

Flexibility is an important determinant of how long a cable will last. The more flexible the cable, the less likely it will break. Steel strand cables common in curtain applications are 7 x 7 or 7 x 19. A 7x 7 cable has seven bundles with seven wires per bundle. Seven x 19 cables are preferred; since they are usually more flexible and so do not need as large a pulley as 7 x 7 cables.

To further reduce cable wear, the pulley should have a smooth interior surface as well as bearings to minimize cable slippage over the pulley. Wear against the side of the pulley will dramatically reduce pulley life. Cables must also be properly aligned with the pulley groove, or they will not last long despite other precautions.

Controlling naturally ventilated buildings

Automatic controls are needed to maintain the indoor temperature and provide air exchange as weather changes hourly and seasonally. Natural ventilation system controllers are available to regulate air exchange, by adjusting inlet and outlet opening sizes. **Controllers** also regulate the supplemental heating rate. **Sold state controllers** and **computer systems** capable of controlling the inlet and outlet opening and supplemental heaters are available. They can use both time and temperature to provide the desired ventilation strategy. Thermostatic control is typically used to turn on and off supplemental heaters as needed. Automatic curtain controllers are preferred for controlling the inlet openings in naturally ventilated buildings because they typically assure adequate air exchange though circulation fans. Manual control is discouraged to avoid rapid drops or rises in interior temperature and moisture content.

ELECTRONIC VENTILATION CONTROLLER TERMINOLOGY

The following are terms that may be encountered when dealing with ventilation controllers.

Bandwidth – Associated with variable speed fans, refers to the temperature difference to cause a variable speed fan to change from operating at a minimum rate to a maximum rate. Bandwidth is usually an input for variable speed fans.

Cycle timer – Used to cycle fans on and off in timed intervals, for instance, two minutes on and then eight minutes off. This is a method of reducing the ventilation rate to a rate lower than the smallest fan can provide running continuously. This method is generally not the best one for livestock buildings.

Differential – Refers to the temperature difference between ventilation stages. This is generally an input on most controllers. The advantage is that all the temperature settings are relative to set point. It the set point is changed, all other stage settings remain the same relative to the set point. Heater differentials are degrees below the set point.

Humidistat – Measure relative humidity and control ventilation rate based on the humidity set points. These generally are secondary to thermostats due to general reliability.

Minimum speed – The lowest speed that a variable speed fan runs at. This is expressed by a percentage that is input by the user. Some controllers use motor curves that approximate percent air movement while others are only a percent of voltage.

Minimum speed curve – This is programmed change in minimum ventilation. Multiple minimum speed settings are entered along with the coinciding day to allow for changing needs of ventilation related to poultry growth. This is used to gradually increase the minimum ventilation as the birds grow.

Motor curves – Some controllers are capable of using pre-programmed information about fans and motors to adjust variable speed fans. Because fan output is not proportional to voltage, this makes for more accurate control at low speeds.

Continued ….

ELECTRONIC VENTILATION CONTROLLER TERMINOLOGY - continued

Multiple temperature probes – Some controllers are capable of using more than one temperature probe. The readings are then either averaged or used for zone control with some very sophisticated controllers.

Offset – A temperature differential in which nothing happens. For instance, there is generally an offset for heating which is the difference between the set point temperature and the point at which the heater is turned off. In ventilation it is generally the number of degrees between when one variable speed fan is full speed and the next one starts.

On/off control – simple control by either having fans on full or off.

Ramping – Similar to the concept of a minimum speed curve except it is a changing temperature program based on the anticipated temperature needs of the growing animals.

Relative temperature – Used in controllers to allow the user to create a ventilation program that can be easily changed without resetting all the temperatures in the program. For instance, if the set point of a controller was 78°F and the other stages were to come on at 82°F and 86°F, they would be entered as a relative temperature of 4°F (82-78) and 8°F (86-78).

Set point – The desired target temperature for a room. Ventilation and heating temperatures are averaged and used as the basis for control.

Temperature averaging – When multiple temperatures probes are used the measured temperatures are averaged and used as the basis for control.

Temperature curve – Multiple temperatures are entered along with the coinciding day. This is used to gradually decrease the temperature as animals grow and their required temperature decreases.

Thermostat – A controller that measures temperature and turns equipment on and off based on the measured temperature.

Variable speed controller – A controller that proportionally changes the speed of a fan in order to regulate air flow.

Automatic curtain controllers are set with **thermostats** to control inside temperature by adjusting the sidewall openings. When temperature falls outside the thermostat **set point** range, the curtain machine will start and the curtain will open or close a set distance, 3 inches for example, then stop and wait, for perhaps four minutes, before any further adjustments to curtain position are made. This four-minute cycle is necessary to allow the building environment and thermostat to react to any temperature to react to any temperature change resulting from the new curtain position.

The inlet and outlet openings are adjusted to control the air exchange rate. The inlets need to provide the minimum air exchange necessary for moisture control during cold weather when supplemental heat is needed. In mild and warm weather the inlets and outlets need to provide sufficient air exchange to maintain the desired inside temperature. Various devices can be used to adjust the opening size; pneumatic systems' either manual or motorized cable and winch systems; and motorized mechanical arms. Typically the opening control units make small adjustments, either increasing or decreasing the sidewall and ridge opening size, on a frequent (every 10 minutes) basis to either increase or decrease the air exchange.

Insulation

A well-**insulated** building shell is needed to successfully naturally ventilate a poultry house. Insulation **helps prevent condensation** on the inside surfaces, reduce **heat loss** in cold weather, and **reduce solar heat gain** in warm weather. Thermal buoyancy is enhanced by reducing building heat loss through the building shell.

Condensation occurs when the building's inside surface temperature dips below the indoor air's dew-point temperature. Condensation is prevented by providing sufficient insulation to maintain inside surface temperatures above the dew-point temperature. Insulation also reduces building heat loss; however, only 20% of the total heat (i.e., building and air exchange) is lost through the walls, ceiling, and perimeter in most poultry facilities in cold weather. The majority of total heat is lost through the cold weather air-exchange needed to control moisture and maintain acceptable air quality. The insulated building shell also reduces solar heat gain in the summer; especially insulation located on the underside of the roof.

The amount of insulation, as measured by the **resistance or 'R' value**, should be in the mid-teens for walls and the mid-twenties for ceilings and roofs. Higher 'R' values are sometimes used in facilities in cold climates like the northern U.S. and Canada. Since the primary function of insulation in poultry facilities is to prevent condensation, excessively large insulation values (R values greater than 25 in the walls and 40 in the ceiling) have limited benefit.

Proper installation is critical for achieving a uniformly and completely insulated building. It is critical to protect insulation from the moisture produced in a poultry house with some type of **vapor retarder** (formerly called vapor barrier). Generally, the vapor retarder is a 4 or 6 mil thick polyethylene film that is placed on the warm side of the insulation. This prevents water vapor inside the barn from moving into the insulation and condensing in the insulation inside the cold wall. Polyethylene film or sheets should always be used even if the insulation has an attached vapor retarder (i.e., aluminum foil backing on fiberglass blankets). The large moisture load in a poultry facility can cause significant moisture problems with even very small breaks in cracks in the vapor retarder along studs, ceiling joists, and electrical outlets.

Protecting the insulation from rodents (mice and rats) is also very important. Rodent control is difficult in poultry housing facilities (see Chapter 13 for more information on pest management), but is necessary to safeguard the insulation. Crushed rock around

the perimeter of a building to prevent rodents from burrowing under the walls and maintaining bait and trap systems throughout the farm to hold down rodent populations, are highly recommended for preventing insulation deterioration in walls and ceilings.

Building foundations are another important place to insulate. **Perimeter insulation** will keep concrete floors and inside wall surface temperatures warmer, making it more comfortable for animals during cold weather. Perimeter insulation also eliminates condensation and frost in these areas. Rigid board insulation is recommended with an R value between 6 and 8m extending 2 or 3 feet below ground level.

A common practice in cold climates is to completely close the opening on the sidewall that comes in contact with prevailing winter winds (usually the northern wall). This is not recommended since it will result in poor air quality in the windward side of the building. A better strategy would be to have a small opening on the windward side that is protected from direct wind exposure by a windshield.

Heaters

Supplemental heat is usually needed in naturally ventilated grower houses to maintain desired indoor temperatures during cold weather. Different types of heaters are used for supplemental heating in poultry houses including radiant, space, and make-up air heaters. Radiant heaters work well for improving bird comfort but do not heat the room air directly. Radiant heaters warm surfaces, which give up heat to warm the room air. Unit space heaters heat room air directly. Make-up heats heat incoming ventilation air.

Unvented heaters add both heat and the products of combustion into the building. The products of combustion include gases that can create health and safety problems within the building if gas concentrations accumulate. For this reason unvented heaters are often not recommended. Proper maintenance and burner adjustment is critical for effective heater operation and minimizing the amount of undesirable combustion products like carbon monoxide from being produced. If unvented heaters are used, increase the cold weather ventilating rate by 2.5 CFM/1,000 BTU/hr of heater capacity because of the moisture and products of combustion added to the building. For a 100,000 BTU/hr (typical) heater this would mean an increase of 250 CFM of airflow by the continuous ventilating fan.

L. Combined mechanical and natural ventilation systems

Most curtain-sided poultry houses employ both mechanical and natural ventilation systems. These are entirely separate systems that operate independently at different times in the grow-out cycle. The system uses depends on the priorities for the season and situation. Generally, ***mechanical ventilation is used for cold weather*** when young birds are involved. ***Natural ventilation is used for mild and warm weather***. ***Tunnel ventilation is used for hot weather*** with **evaporative cooling** being added for extreme hot weather.

The decisions will depend on the temperature extremes in the area and the size of broiler grown. Although they are used mostly for broiler production and the grow-out

phase of turkey production, combined or hybrid systems may also be used for breeding flocks. At certain times, fine control of the minimum ventilation rate is needed, and it is best achieved using mechanical ventilation. At other times, temperature control is not as critical, and ventilation can be provided more cost-efficiently by using natural ventilation.

The two ventilation systems, mechanical and natural, differ mainly in the level of control they give a grower over house temperature, air distribution, and air quality. Natural ventilation offers a relatively low level of control over air exchange and distribution and is therefore best suited to times when outside conditions are close to the conditions desired inside. During cold weather, when there is a need to carefully control air exchange rate to maximize fuel use efficiency, proper air distribution, and warmth at bird level, then mechanical ventilation is desirable.

The advantages of the combined system are a combination of the strengths of the individual systems. They are:

- When using supplemental heating, the ventilation exchange rate is controlled using mechanical ventilation, which conserves heating fuel.
- Natural ventilation can be used during warm weather and during periods when birds are mature, thereby saving electrical energy for fans while still providing a high level of air quality.
- Tunnel ventilation and/or evaporative cooling can be used during hot weather to enhance cooling.
- One facility is flexible enough to handle birds for the entire grow-out period, no matter what season of the year, and to meet their changing needs.
- During power outages, curtain drops may be used to prevent excessive mortality during warm or hot weather.

The disadvantages of the combined systems are:

- More equipment may be required for each building because it must operate as both a mechanical and a natural ventilation system. Therefore, some specialized equipment may not be fully utilized.
- Some cold weather heating inefficiencies are built into the system due to the use of sidewall curtains, which allow infiltration and have a lower R-value than an insulated wall.
- A sophisticated control system is needed to effectively make transitions between mechanical and natural systems.
- Poor air quality and potential heat stress problems may occur during transition periods when fans are not running and sidewall curtains are closing or opening.

In combined ventilation systems, **two sets of sidewall inlets** are usually needed: **adjustable baffle inlets** for mechanical ventilation and **sidewall curtains** for natural ventilation. A third inlet configuration will be needed if an **evaporative cooling** or **tunnel ventilation** function is included in a hybrid system.

The three options for mechanical ventilation inlets for cold weather use are **adjustable baffle inlets**, a **curtain crack**, and a **fixed board crack**. These inlets are similar in that they bring air uniformly into the house. They differ considerably in their ability to control the direction of airflow and the mixing of cold entering air with warmer inside air.

The most desirable air distribution is provided by the **adjustable baffle inlet**, which provides more uniform air mixing throughout the house by directing air along the ceiling. This mixes the cold incoming air with the warm air that has stratified near the ceiling, and the mixed air is then circulated back down toward the bird for improved fresh air distribution and efficient heat use.

In contrast with the air distribution provided by the adjustable baffle inlet, a **curtain cracked** open less than an inch will direct air down the floor, chilling the birds, and triggering furnaces or brooders to turn on. The result is uneven air distribution, wasted fuel, and poor air distribution. For these reasons, curtain crack inlets are not recommended.

Fixed board openings are a better option than a curtain cracked open. Fixed board opening design provides intermittent inlet holes along the top overlap board of the curtain. These openings direct air straight into the house while providing more uniform air distribution throughout the long length of curtain. Notched boards can be positioned to allow exposure of increasing inlet opening as the curtain drops or intermittently leaving a board off can provide the desired configuration of openings.

As the curtain drops, these spaces will act as inlets while the rest of the curtain remains closed. Although fixed board openings are a simple alternative to the mechanical complexity of an adjustable baffle inlet, they do not function quite as well. Although they will not provide the air distribution and direction of adjustable baffle inlets, fixed board openings are sometimes used effectively in mild climates and are preferred over curtain cracks.

Hot weather combined systems incorporate **cooling strategies** into the ventilation system in order to reduce heat stress effects on broilers. Such systems are natural ventilation during cold and mild weather until the temperature reaches a setting at which the curtains are closed and mechanical ventilation takes over for enhanced cooling. The most common types of hot weather combined system use tunnel ventilation to supply airflow for effective evaporative cooling.

Tunnel ventilation is designed to provide **high-velocity air** to cool broilers (i.e., the windchill effect). To accomplish this, the natural ventilation sidewall curtains must be closed while the inlet for the tunnel ventilation system is opened at one end of the house. **Fans** on the opposite end provide the air exchange needed to create the tunnel airflow. The difficult portion of the transformation is the coordination of the closing of sidewall curtains, the opening of tunnel inlet curtains, and the switching on of fans. If the fans are running before the sidewall curtain is fully up, the static pressure created will suck the curtains into the sidewall structure resulting in slow or halted curtain movement during the transformation. A poorly coordinate transition can thus result in torn curtains or broken winching equipment, as well as incomplete transformation to tunnel ventilation system. **Evaporative cooling systems** are often used in conjunction with tunnel ventilation system.

Generally it is best to mechanical ventilate when it is 15°F cooler outside than the desired indoor temperature. With smaller birds, which have less sensible heat loss and are more susceptible to drafts, a 10°F differential is a better criterion.

One disadvantage often encountered in naturally ventilated buildings is the low level of **insulating value** provided by the sidewall curtains, in addition to the infiltration leaks commonly caused by careless curtain installation and maintenance. Mechanical ventilation recommendations are based on maintenance of certain static pressure differences for proper function. **House tightness** affects the ability of the ventilation system fans to create the desired static pressure difference. Efficient mechanic ventilation requires a tight house.

A simple way to determine the level of house tightness requires a **manometer or static pressure gauge**. This should already be part of the mechanical ventilation controls. If the house lacks a static pressure gauge, use a manometer. Close up the house entirely by closing all sidewall curtains and mechanical ventilation inlets (in addition to all doors and windows, of course). Turn on two 36-inch exhaust fans or one 48-inch fan. These are the timer fans used for coldest weather ventilation with nominal capacity of 20,000 CFM. A house with no leakage should have a static pressure difference of about 0.2 inches. A static pressure difference between 0.09-0.10 inches is considered excellent; 0.06-0.08 inches is good; and 0.01 – 0.02 inches is poor.

To improve house tightness, small openings in the structure need to be sealed. Smoke bombs can help visually identify where air is entering the house during the tightness test. Most cracks can be eliminated at minimal cost. Inspect the following:

- Curtains
  - Tighten straps to hold curtain tight against the side of the house.
  - Provide a minimum of 6-inch curtain overlap with sides and top.
  - Keep bedding out of the floor area below the curtain so it closes completely.
  - Repair holes with curtain tape.
- Fans
  - Remove dirt so that shutters close completely.
  - Insulate or plastic wrap the inside of any fans not used during winter.
  - Caulk gaps around fan housing.
- House
  - Caulk and fix leaky side and end wall doors.
  - Cover holes in side and end walls.
  - Fix holes in ceiling vapor barrier and/or insulation.

M. Emergency ventilation

Carbon dioxide (CO_2) concentration in properly ventilated poultry housing can be 3,000 ppm. High CO_2 concentration (above 30,000 ppm) contributes to oxygen deficiency and asphyxiation. Similarly, heat and moisture can build up. Since broilers can die if the power or ventilation system fails, emergency ventilation should be provided. ***Poultry can survive only 20 to 30 minutes at temperatures above 97°F with still air.***

Emergency ventilating systems can range in complexity from an **electromagnetic, automatic sidewall-curtain drop** for naturally ventilated buildings, to a **stand-by electric generator** that automatically engages when electrical power fails for

mechanically ventilated houses. Emergency ventilation openings with curtain drop should be sized according to broiler age and outside weather conditions. With young, floor-raised broilers, 12V battery-driven brooders may be used to provide emergency heating during cold weather and power outage.

Consider installing an **alarm system** to alert you when electrical power is off. ***Test your emergency ventilation and alarm systems regularly*** according to the manufacturer's instructions.

N. Fan selection

The air exchange capacity of a mechanical ventilation system is provided by fans. Fans discharge a volume of air per minute from the building and, in concert with inlets and a static pressure difference, cause fresh air to enter the building to replace the exhausted air.

An **exhaust fan** creates a slight vacuum within the structure compared to outside static pressure. The static pressure difference required to ventilate a building is very small – on the order of 0.05-inch water (pressure is often measured as a depth of water in a column). This can be visualized as the amount of suction needed to draw water 5/100 of an inch up a straw. This may not seem like a lot of suction, but it is enough to create sufficient airflow to properly ventilate a building. Static pressure should be maintained within a reasonably constant range. Creating a static pressure difference requires relatively tight building construction, however, and not all poultry buildings meet this criterion. Mechanical ventilation buildings need a static pressure gauge (manometer) so the operator can verify that desired static pressure (0.05 to 0.08-inch water) is being maintained.

Fans for the poultry house ventilation are **belt- or direct-drive propeller fans** and are designed for providing large volumes of air against low airflow resistance. Poultry house fans require totally enclosed motors for protection from dust and gas damage. In a conventional system, fans are often banked, or installed side by side, in sets of tow to four fans approximately every 50 to 100 feet along one or both sidewalls of long poultry buildings. Some producers locate summer fans on or near one end wall for tunnel ventilation applications.

The **resistance to airflow** that must be overcome by fans is affected by ventilation inlets and fan shutters and guards. Additional pieces of equipment, such as wind protection devises, evaporative pads, or light traps, further restrict airflow. Fan airflow capacity is influenced in turn by static pressure, which is most effective when kept at 0.05 to 0.08 inches water gauge across the poultry house inlets. This is monitored as part of the ventilation system control, but it only represents one component of the static pressure difference against which the fan must operate. Total resistance along the airflow path from outside to building interior and back outside, can be as high as 0.20 inches in a water gauge if the fan is moving air through evaporative pads or exhausting air into strong winds. Obstructions within twenty fan-diameters' distance downstream of the fan should be minimized. For example, a 36-inch fan should have no obstructions within 60

feet of its exhaust side. Light trap hoods violate this rule, but they are often necessary for light-controlled pullet and layer houses.

Fans are used in mechanical ventilating systems to supply the energy needed to exchange the desired amount of air in a poultry house each minute. In a negative pressure system, fans are installed to exhaust stale or used air from the building and bring in fresh, clean air. It is very important to **use only rated fans**.

Fan ratings are typically given in cubic feet of air per minute (CFM), or in SI units – cubic meters of air per hour, at specific static pressure levels. Fan ratings are given in table form, similar to Table 7.1. Look for certification by an organization like the Air Movement and Control Association (AMCA - http://www.amca.org/) when purchasing fans. With rated fans there is some assurance that the CFM rates given in the table are valid. Individual fan ratings depend on motor horsepower (HP) and fan speed (RPM), the shape, and shroud design around the blades. Fans with the same diameter can have very different CFM values. Because it is very difficult to accurately determine a fan's CFM capacity when it is already in place in an existing facility, it is very important to use rated fans when selecting or replacing a fan so that the air exchange or ventilation rate is known.

Table 7.1 - Typical rating table for exhaust fans (Delivery rate in cubic feet per minute (CFM) at listed static pressures).

Fan Diameter (inches)	Fan Speed (RPM)	Motor Size (HP)	Static pressure (inches of water gauge)					
			0 (Free air)	1/10	1/5	1/4	3/8	1/2
Direct drive			Air delivery rate (CFM)					
8	1650	1/50	400	36	289	--	--	--
10	1550	1/50	594	457	413	--	--	--
12	1550	1/30	730	--	--	--	--	--
12	1600	1/12	1,188	1,073	1,035	827	--	--
16	1725	1/3	2,534	2,392	2.353	2,142	2,890	1,635
16	1700	1/4	3,020	2,790	2,725	--	--	--
16	1670	1/4	3,410	2,970	2,860	1,300	--	--
18	1140	1/6	2,686	2,460	2,395	--	--	--
18	1725	5/8	4,065	3,920	3,880	3,682	3,445	3,195
21	1140	1/4	3,812	3,599	3,540	--	--	--
21	1725	3/4	4,914	4,770	4,740	4,510	4,320	3,920
24	1070	1/3	6,560	5,680	5,450	3,680	--	--
24	1140	1/2	6,990	6,320	6,150	5,070	--	--
24	1140	7/8	6,254	5,990	5,920	5,470	4,810	4,220
36	840	1/2	11,300	10,070	9,710	--	--	--
36	830	1/2	10,700	9,200	8,750	6,000	--	--
Belt drive								
36	650	1/2	10,300	8,800	8,350	--	--	--
36	480	1/2	11,500	9,800	9,400	--	--	--
48	360	1	19,700	16,700	16,000	9,000	--	--
48	410	1	18,100	15,600	14,750	8,700	--	--

Agricultural ventilation fans may be chosen for **CFM delivery** at $1/10^{th}$ (0.10) or $1/8^{th}$ (0.125) inch static pressure. Mechanically ventilating systems, including negative, positive and neutral pressure, operate at static pressures slightly below these levels. However, when the fans are selected at static pressures slightly above operating conditions, a small safety factor is provided, to ensure that sufficient air exchange is provided through the building when wind is blowing into the fan exhaust. When higher

resistance conditions are expected, as when drawing air through evaporative cooling pads or light traps, choose fans capable of delivering airflow at the higher resistance. The maximum airflow of a fan at any speed occurs at free air, or zero static pressure. Wind blowing against the fan increases the static pressure the fan experiences. A fan's **ventilation efficiency ratio**, in CFM per watt, represents its performance versus operating cost. Electrical energy efficiency is most critical in large capacity fans that operate primarily during warm weather. Energy efficiency criteria for the continuous or cold weather operating fan(s) is less important because they move a small percentage of the total air flow in the ventilation system.

Airflow capacity and efficiency of a fan are improved by good blade design, small clearance between blade tip and fan housing, smooth panel design, and presence of inflow and/or discharge cones. Fans should also be selected with maintenance requirements, noise levels, dealer service, and cost in mind.

One large fan is usually more energy-efficient and less expensive to purchase and operate than several smaller fans. Larger fans will also save on installation costs, because less wiring and carpentry are required. Fewer controls are needed, and larger fans usually give lower total power consumption from improved efficiency. Energy efficiency of winter fans is less important than their reliability at higher static pressures.

It is important to evaluate and select fans that have been tested under conditions similar to those expected in the poultry facility. Manufacturers offer fan performance data for bare fans with no additional equipment in place. This is not typical of an installed agricultural fan. Most manufacturers also offer fan performance data with various equipment options in place. Ask for this more appropriate data. For example, if an installed fan will have shutters and guard, evaluate data obtained when the fan was rated with shutters and guard in place. If that information isn't provided, add the static pressure resistance associated with these accessories to your estimate of the total static pressure against which the fan will operate.

Other factors influencing fan performance and/or operating cost include electrical cost, blade revolutions per minute (rpm), motor size and design, fan/motor matching, maintenance, and bearing design and lubrication.

Fan performance can vary widely among different models and manufacturers. At 0.10-inch static pressure, a 36-inch fan may deliver as little as 6,200 CFM for the worst performer and as much as 13,000 CFM for the best. The best fans have relatively flat performance curves across the range of operating static pressures (0.08 to 2.0 inches of water). By selecting the best performing fan over the worst performing, one can double the airflow capacity of a ventilation system. These data underscore the necessity of checking rated fan data, rather than relying on a 'rule of thumb' that indicates that a 36-inch fan provides 10,000 CFM. A rule of thumb is acceptable for a first estimate, but specific rated fan data should be used when selecting fans for the system.

Select energy-efficient fans which have a high CFM per watt ratio at the ventilation system's operating static pressure. Efficient fans have high output in CFM with lower input cost in kilowatt hours (kwh) of electricity. Again, the fan efficiency should represent

conditions in which the fan will be operated. The best fans are almost twice as energy efficient as the worst fans.

The annual electricity cost of a fan is calculated as: A = (8.76 x N x T x P x C x K)/VER

where A = annual energy cost, $/yr
N = number of bird batches per year
T = time each bird batch spends in the house, in days
P = current electricity price, $ per kilowatt hours
C = installed fan capacity, CFM
K = fan utilization fact, fraction
VER = ventilation efficiency ratio, CFM per watt

The **fan utilization factor** indicates the proportion of time a fan is operating. For example, one or two fans in a poultry house may run continuously all winter and throughout warm weather for a fan utilization factor of nearly 100% of the time, or K=1. Other fans are staged to come only under the hottest conditions and may only be used 25% of the year, for a K=0.25.

Variable-speed fans have the advantage of continuous variation between their minimum and maximum ventilation rates. Smooth airflow changes reduce temperature swings that can occur with staged, on-off fan control. When properly sized and controlled, variable-speed fans can reduce building energy costs. Variable-speed fans are direct-drive, and motor voltage varies the revolutions per minute (RPM) of the fan blade, thus modifying the airflow rate. When operated at low speeds, however, variable-speed fans have the disadvantage of losing their ability to resist wind-induced back-pressure on the fan. Variable-speed fan performance is reported as a set of characteristic curves reflecting static pressure versus airflow.

At low speeds of 20-50% capacity, most variable-speed fans will not deliver adequate, reliable airflow under typical agricultural ventilation conditions. For example, a 36-inch fan will not provide any airflow when static pressure exceeds 0.15 inch at 120 V (50% of fan capacity). This will often result in stalling, blade reversal, and motor overloading. Variable-speed fans are also inherently prone to wind interference when operating at low voltages because they generate negligible pressures when compared to wind pressures. A wind blowing into a fan can easily provide an amount of static pressure against which a low-speed fan cannot provide airflow. When this happens, the fan may still have blades turning and appear to be working, but air is actually entering the building rather than exhausting.

Variable-speed fans equipped with electronic motor-speed controllers automatically adjust motor voltage and thus fan speed continuously for smooth changes in airflow rate. Decades ago, field experience and research reported inefficiencies, motor overheating, speed instability, insufficient torque, mechanical vibration, and acoustical noise associated with variable-speed fans. However, recent design improvements, such as speed and airflow feedback devices, have minimized or eliminated many of these problems. Variable speed fans are not common in poultry houses but they may be an attractive option.

Consider the following when using variable speed fans.

1. Limit the lowest speed setting to 50% of fan supply voltage unless the fan system is equipped with speed or airflow feedback. For example, if the fan speed setting corresponds to 100 volts with a 220 volt supply voltage, the fan motor may overheat.
2. Protect fans from wind by locating away from prevailing winds and/or installing wind protection devices.
3. As voltage (and airflow) is reduced below 100% capacity, the fan efficiency in CFM per watt is also reduced.

O. Fan accessories

Accessories are necessary for proper functioning of the fan as part of a ventilation system, even though they often reduce airflow and efficiency. Typical equipment installed on a fan includes a guard, which prevents animals, people, or objects from contacting the blades; and shutters, which prevent airflow when the fan is not in use.

Guards always should be installed for the safety of people and animals near the fan, but they also protect the fan from damage. Guards generally disrupt airflow and efficiency by less than 5%. Round ring guards with concentric circles of wire disrupt airflow less than wire mesh guards. A guard should be installed on any side not protected with fan shutters.

Shutters can be used on either the inside or outside of most fans. Interior shutters are preferred over exterior shutters because they are easier to clean and provide about half the resistance to airflow. Shutters placed on the discharge side of fans are particularly detrimental to airflow. Air exiting the fan blades circulates forcefully in a spiral pattern, and this fast-moving, circulating air will be disrupted by horizontal shutters. Expect a 10-15% airflow reduction using inlet-side shutters and a 15-25% reduction using discharge-side shutters. For stage-one fans that operate continuously year-round, shutters can be removed for improved airflow. Fans staged to operate in only warm or hot weather need shutters or they will act as an inlet and hence disrupt the ventilation system airflow and static pressure when not in use.

Fan performance can be improved with well-designed fan housing and with inlet or **discharge cones**. A well-designed fan has a tight clearance between fan blade tips and its housing. This discourages air from coming off the blade tips and flowing backwards through the housing. Streamlined airflow improves fan capacity and is particularly effective with **inlet cones**. Discharge cones offer some airflow improvement and will provide the fan some protection from weather.

One inherent, but often overlooked, fan characteristic is **aerodynamic stall**, which is characterized by a dramatic fall in airflow rate when static pressure is only slightly increased above the stall-pressure. **Stalling severity** depends on fan design and how guards, shutters, cooling pads and other airflow obstructions affect static pressure against which the fan has to operate. The best way to evaluate fan performance is to

obtain rated fan data showing that specific fan's performance at various static pressures. Look for the fans where stalling occurs above 0.25 IWG static pressure.

P. Maintenance

Mechanical ventilation systems need regular maintenance. Test emergency ventilation and alarm systems. Clean heaters and check gas jets and safety shut-off valves for proper operation. Motors and controls should be cleaned as necessary. Check all air inlets and fan housings for blockage. Check thermostat and controller calibration and settings. Because belt slippage causes blades to turn slower and deliver a proportionately smaller airflow, fan belt tension should be adjusted and worn belts replaced. Dust- and feather-covered fan blades, shutters and grills reduce exhaust fan output but 30-40%. Fan blades and shutters should be cleaned and lubricated every one to three months.

Fans that are not being used (for example, hot-weather fans during winter) should be sealed against unwanted infiltration with plastic or a simple top-hinged, manually-closed panel. Ensure that the fan housing is unsealed before the fan is put back into operation.

Recommended maintenance schedule

Every month:

- Clean fan blades and shutters. Dirty fan shutters can decrease fan airflow up to 40%. Shut off power to thermostatically controlled fans before servicing them.
- Check fans with belt drives for proper tension and correct alignment. It too tight, belts may cause excessive bearing wear; if too loose, slippage reduces fan performance and wears the belt.
- During the heating season, remove dust from heater fins and filters, and check gas jets and safety shut-off valves for proper orientation.
- Test emergency ventilation and alarm systems including standby generators.
- Clean heat exchanger (some manufacturers suggest cleaning more often).
- Make certain that shutters open and close freely. Apply graphite (not oil or grease) to fan shutter hinges.
- Check fan shutters during cold weather so they do not freeze open or shut.

Every 3 months:

- Check gable and soffit air intakes for blockages.
- Clean motors and controls. Dirty thermostats do not sense temperature changes accurately or rapidly. Dust insulates fan motors and prevents proper cooling. If dust is allowed to build up, the motor can overheat.
- Clean dust accumulation from recirculation air ducts, if necessary.

Every 6 months:

- Consider fan lubrication. Most ventilating fans have sealed bearings and do not require lubrication. Follow fan manufacturer's recommendation for oil type and amount. Never over lubricate.
- Recalibrate thermostat, as needed.
- Clean guards and weather hoods.

Every year:

- Clean and repaint chipped spots on fan housings and shutters to prevent further corrosion.
- During winter, disconnect the power supply and cover hot weather fans (not cold or mild weather fans) with plastic or an insulated panel on the warm (animal) side of the fan. Uncover in the spring.
- Check air inlets for debris and warping.
- Check plastic baffle curtains. They can become brittle with age and require replacement.
- Check attic insulation for signs of moisture and packing or removal by rodents.

PENNSTATE
College of Agricultural Sciences Cooperative Extension
Agricultural and Biological Engineering

Principles of Measuring Air Quality

Evaluating Livestock Housing Environments

Part 1 of 3

Eileen Fabian Wheeler, Assistant Professor
Robert Bottcher, Professor, North Carolina State University

Good air quality leads to healthy animals and productive animal facilities. When we evaluate air quality in livestock housing, what do we want to determine? What makes one indoor animal environment better than another? Instruments allow us to objectively evaluate and quantify environmental parameters. Instrument readings then can be compared to recommended environmental levels. The second part of this series of three fact sheets, *Instruments for Measuring Air Quality,* describes types of instruments and how to take proper measurements.

An evaluation of indoor air quality must emphasize the animal perspective, which is not necessarily the same environment in which a human would feel comfortable. Air quality characteristics are most important in the zone where the animal is confined.

Animal health and comfort must be the primary concern in livestock facilities. After all, animals often remain in that environment all day, while workers only visit periodically for chores and inspection. The comfort of humans working in the facility should not be disregarded, but it can be effectively controlled by means such as clothing rather than by keeping the whole environment adjusted to human standards. Temperature seems to be the main environmental difference between livestock and human comfort zones. In general, the comfort zones for adult livestock are cooler than the human comfort zone. Dust and air contaminant levels that provide acceptable air quality for animals are not always reasonable for humans, so protective breathing masks may be necessary for human safety and comfort. Additional building concerns, such as keeping temperatures above freezing, usually can be accommodated while maintaining an adequate animal environment.

Commonly-measured air quality characteristics related to animal comfort include temperature, humidity, and air speed. These are easily measured and roughly characterize the animal environment. Contaminant gases or dust also are important. The temperature of walls and floors will affect animal comfort, as will cold air drafts. Effective environmental temperature accounts for the combination of air and surrounding building surface temperatures plus the effect of air moving over the animals.

We also should evaluate the ventilation system, which is responsible for many major aspects of indoor air quality. This is the topic of the third fact sheet in this series, *Evaluating Mechanical Ventilation Systems*. System characteristics, such as air speed through fans, pressure differences the fans operate against, and air speed at inlet openings, are easily measured. However, instruments must be used properly to obtain values that truly represent the system. Air flow visualization is a useful tool to evaluate environmental conditions and the ventilation system's air distribution.

Principles of Measuring Anything:

1. Measure the right thing. Measure characteristics of air the animals are breathing and/or the air blowing over their bodies. If cow comfort is the issue, get in with the cows and measure the air quality in their zone. Get down to the level of the pig's nose. Go into the sleeping areas of penned animals and within, or at least between, the cages of layer hens. Air characteristics such as temperature, humidity, and particularly levels of contaminant gases such as ammonia, can vary greatly within a livestock confinement zone. Compare measurements taken in resting, eating, and manure handling areas.

2. What is the instrument measuring? The instrument can only read what it is exposed to.

Be aware of what part of the instrument senses conditions. Exposing an instrument to an environment alters the environment immediately adjacent to the instrument. Positioning an air velocity meter in the jet of air exiting a fan disturbs the air, forcing it to go around the meter. The measured velocity represents a disturbed air flow, yet this effect cannot be completely avoided. A human positioning and reading the meter while standing in the air jet exiting a fan adds a very large human obstruction to the disturbance created by the meter. This obstructed air velocity measurement will not be indicative of air flow normally exiting the fan. Similarly, a temperature probe positioned in direct sunlight will indicate a higher temperature than a probe positioned more appropriately under cover. Decide what it is that you *want* to measure and position the instrument to most appropriately measure that quantity.

3. Understand how your instrument works. By understanding basic principles of how the instrument detects air characteristics, you can troubleshoot the *instrument* when curious readings are obtained or when adjustments and calibrations are needed. A number is only as good as the understanding that went into determining it. For sensitive instruments, how do you know if fluctuating readings are a natural part of the air you are trying to characterize or part of the instrument's measuring mechanism? How long does it take the instrument to determine and display a stabilized reading? Livestock housing is too dusty, humid, or dirty for some instruments to work properly. For example, instruments that measure humidity by the expansion and contraction of fibers as humidity changes are unreliable in livestock settings. Some instruments may work well for a while in livestock buildings, but then go out of calibration. You need to be able to diagnose such problems.

4. Question each reading. Does the reading make sense in the environment being considered? Take more than one reading. A set of three readings often is necessary to confirm that sporadic measurements are reliable. Air velocity measurements, due to gusty conditions, may never settle down into one distinct reading, so a range of readings should be averaged.

5. Record your readings and observations. Summarize the results. Is there a pattern? Do measured conditions correspond to an observed or perceived problem? Be sure to include conditions which affect the enclosed animal environment, such as outside weather conditions, livestock density, management practices, behavior, etc. Environmental conditions change during the day. It may be necessary to use a recording instrument, maximum-minimum instrument or simply more than one "reading session" to correctly characterize an environment.

Now What?

Once measurements are taken, the numbers should be compared to desirable conditions. Improvements to environmental quality can then be pursued with more certainty about current conditions and future achievements. Desirable air quality characteristics depend on animal species and age. The resources listed below provide guidelines. Within livestock housing, a range of temperature and humidity levels are acceptable. Contaminant gases and dust levels need to be kept below a threshold. For young animals, air speed is kept below a certain level to avoid chilling, while for adult livestock, during hot weather, there will be a minimum desired air speed for cooling effect. These recommended air quality characteristics are the goals for a productive animal environment. With instruments, we can evaluate current conditions and after an analysis, make recommendations for improvement.

Resources for Environmental Guidelines

MWPS-32, *Mechanical Ventilating Systems for Livestock Housing*
MWPS-33, *Natural Ventilating Systems for Livestock Housing*
MWPS-7, *Dairy Freestall Housing and Equipment*
MWPS-8, *Swine Housing and Equipment Handbook*
NRAES-17, *Special-Fed Veal Production Guide*
NRAES-63, *Dairy Reference Manual*

For a complete list and prices of MWPS and NRAES publications, write to:
Publications Distribution Center
112 Agricultural Administration Building
University Park, PA 16802.

PSU
12/95

For a copy of our Fact Sheet Listing contact:
Agricultural and Biological Engineering Extension
246 Agricultural Engineering Building
University Park, PA 16802
(814) 865-7685 FAX: (814) 863-1031

PENNSTATE
College of Agricultural Sciences Cooperative Extension
Agricultural and Biological Engineering

Instruments for Measuring Air Quality

Evaluating Livestock Housing Environments

Part 2 of 3

Eileen Fabian Wheeler, Assistant Professor
Robert Bottcher, Professor, North Carolina State University

Air quality characteristics are quantified with instruments that provide numbers. With these numbers we can compare our environment against a standard and then seek improvement in environmental characteristics. We also can evaluate environmental changes over time. For example, a simple thermometer will tell us that air temperature in a dairy barn is 78°F, yet we know that dairy cows are most comfortable at 60°F or colder (assuming reasonable humidity level). Our goal would be to lower the temperature or compensate for the heat stress in other ways. This publication examines portable, hand-held, field-quality instruments commonly used to diagnose animal environments. It does not discuss instruments typical of ventilation system controls or those used to obtain experimental data. A table of instrument costs and suppliers is provided.

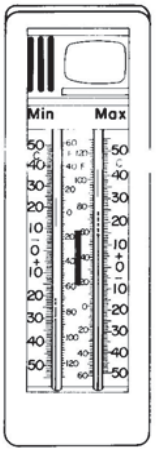
Part 1 of this three-part fact sheet, *Principles of Measuring Air Quality*, offers essential information on how to take correct measurements using hand-held instruments. The third part of this series provides guidance in *Evaluating Mechanical Ventilation Systems.*

Environmental features that can be reasonably measured:	
Common:	Special circumstances:
Air Temperature	Surface Temperature
Humidity	Gases
Air Speed	Dust
Air Flow Visualization	

Measuring Air Quality Characteristics

TEMPERATURE

Air temperature is measured with a common ***thermometer***. Not surprisingly, the thermometer indicates the temperature of the exposed sensor tip, or bulb, which has reached an equilibrium with the surrounding environment. The sensor tip must not be exposed to radiant energy, such as direct sunlight or a heating system radiator, as this will increase the sensor tip temperature. Any measurement taken would not be representative of the surrounding air temperature. Be sure that your measured temperature is representative of air in the zone of importance, usually the area where animals spend most of their time. Air temperature in a central aisle, where air mixing is relatively unrestricted, is probably not indicative of air temperature at the back of the adjacent animal confinement area.



Max-Min Thermometer

A simple maximum-minimum thermometer that can be left in the area of interest is an inexpensive tool that can help determine whether wide temperature swings occur in the building over a period of time. Digital thermometers also are becoming more common. They are easier to read and offer remote sensing capabilities in hard-to-reach animal areas. Digital readouts may offer a false sense of accuracy when meters have an accuracy of ±3 percent yet the readout displays temperature to a resolution of one-tenth of a degree.

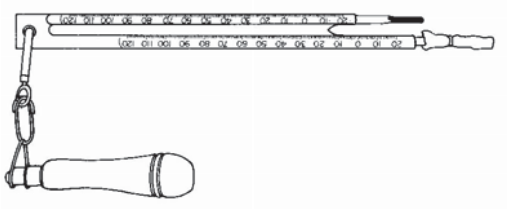
HUMIDITY

Humidity is commonly measured as "Relative Humidity," which compares the “relative” percentage of moisture in the air to how much moisture the air could potentially hold at that same temperature. Air can hold more moisture as its temperature increases. The traditional way to measure humidity is a two-step process: both wet bulb and dry bulb temperatures are obtained, and then converted to relative humidity using a psychrometric chart. (Use of the

psychrometric chart is covered in fact sheet p*sychrometric Chart Use* G-83)

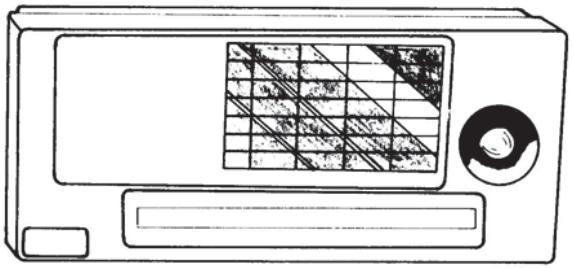
Dry bulb temperature is the commonly measured thermometer temperature. Wet bulb temperature is determined by moving air past a wetted fabric wick covering the sensor bulb. As water evaporates from the wet wick, temperature falls and the sensor reflects a wet bulb temperature. The best accuracy is provided by a clean bulb wick soaked with distilled water. The wick will have to be wetted periodically. With a wet wick, measured temperatures must be above freezing. Air movement can be provided by an aspirated box (with a fan) or by whirling the sensor through the air.

The traditional instrument, called a ***sling psychrometer***, contains two thermometers. One indicates the dry bulb temperature and the other, with a wet wick indicates the wet bulb temperature.



Sling Psychrometer

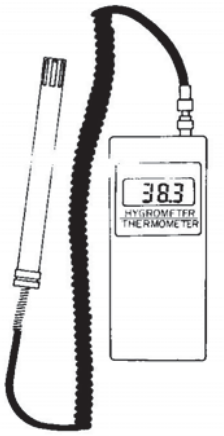
The sling psychrometer is swung around swiftly (900 ft/min) on a jointed handle for about three minutes to obtain the relative air movement needed to extract the wet bulb temperature.



Aspirated Psychrometer

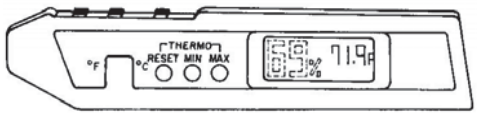
An ***aspirated psychrometer*** operates on the same principles as the sling psychrometer, except that a battery powered fan moves air over the wet wick. Cleanup of the aspirated psychrometer wick can be awkward. Air speed over the wet wick is better controlled by an aspirated psychrometer than it is by whirling a sling psychrometer. In order to take a reading on a sling psychrometer, the whirling of the psychrometer must stop, which begins to change the properties of the wet wick. Hence, the aspirated readings are usually more reliable. Accuracy of the thermometer and careful reading of results are important.

Relative humidity can be measured directly, rather than being determined by two temperatures and a psychrometric chart, by an instrument called a ***hygrometer***. Newer hygrometers measure relative humidity with solid state devices and electronics. The sensor is a matrix material in which electrical properties change as water molecules diffuse into and out of the special material in response to air moisture content. Other hygrometers use materials which indicate electrical changes as water molecules adhere to their surface. Matrix material changes are interpreted and displayed by the hygrometer. Careful calibration is essential. The sensor materials may not tolerate conditions near saturation.



Hygrometer

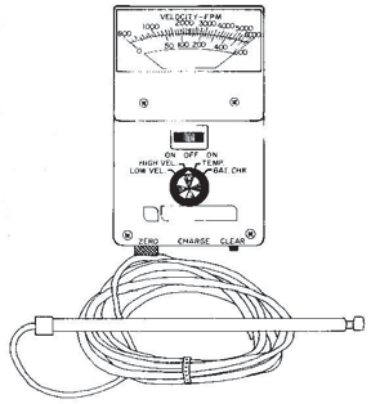
Hygrometers offer the advantage of direct humidity measurements and are available in several cost-accuracy categories. A relatively inexpensive, thick, pen-shaped instrument provides digital dry bulb temperature and relative humidity readings. These pens can take several minutes to display a correct reading and provide humidity measurements with an unimpressive accuracy of ±5 percent. More accurate hygrometers (accuracy +/- 1 percent), with an increased price, are better. On some models, maximum and minimum temperature and humidity can be captured over a pre-determined time period.



Hygrometer Pen

AIR SPEED

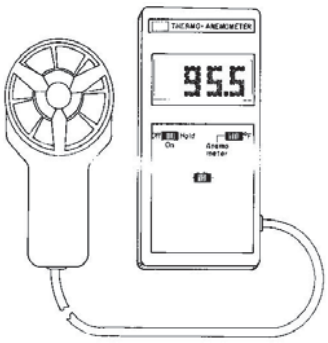
Air speed is measured with an ***anemometer***. In livestock building applications, two types of anemometers are common, depending on the type of air flow being measured: vane anemometers and hot-wire anemometers. Both instruments are composed of two connected parts: one is the sensing probe and the second displays air speed. One key technique in using an anemometer is to take measurements while air speed and direction are minimally altered by the instrument's placement. The operator should stand away from the air flow being measured.



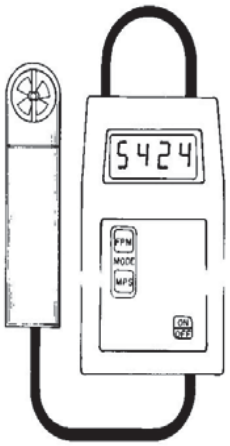
Hot wire anemometer

A ***hot-wire anemometer*** has a very fine, short wire, often the thickness of a human hair, positioned horizontally between two upright supports. Another design uses a thicker, vertical wire, which incorporates a temperature-sensing thermistor. The wire is heated by electronic circuitry and air flowing over it causes the wire temperature to decrease. By detecting this temperature decrease, or by evaluating the amount of current supplied to keep the temperature of the wire from decreasing, the anemometer determines the speed of the passing air. Calibration is important for relating hot-wire temperature effects to air speed. The hot-wire portion of the instrument is fragile and great care must be taken to protect it from physical damage, which can be caused by large dust particles, airborne bedding, feathers, etc. A hot-wire anemometer is the instrument of choice for low air speed applications. Air moving less than 50 feet per minute (fpm) is considered still air. This condition exists in many animal pens and in many draft evaluations. Due to their small size, hot wire anemometers can be used in small places, such as an inlet jet of a ventilation system, or in hard to reach spaces, such as a duct.

The ***vane anemometer*** is a more rugged instrument that is well suited to several livestock applications. Designs vary, but most have an approximately three-inch diameter vane propeller which is turned by moving air. Since it makes an air speed measurement based on a larger area than the hot-wire anemometer, it is better for determining air flow over the face of a fan, or a large duct or sidewall opening. It is not ruined by dust and small airborne debris since it can be carefully cleaned. It does not measure low air speeds because the mass of the vane requires a fair amount of air movement to rotate. Vane anemometers are not considered accurate below 50 to 70 fpm, even though the meter provides a readout at these low air speeds. Vane anemometers must be used in air streams which are at least as wide as the vane diameter. They will not accurately measure narrow inlet air jets which are smaller than the vane anemometer propeller. Vane anemometers with small, one-inch diameter vane heads are available for small jet flow measurement, yet they still cannot detect low air speeds. For low speed air (< 50 fpm) and most small jet measurements, a hot-wire anemometer is required.



Vane anemometer

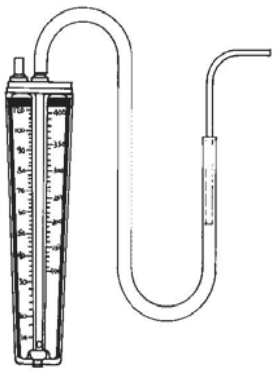


Small headed vane anemometer

One option on vane anemometers is an averaging mode where velocity is displayed as a

running average value over time. This aids in scanning a fluctuating air stream.

Velocity manometers may be used in well-defined air streams of fairly high velocity. A Pitot tube is positioned so air flow directly affects the sensing tip, so streamlined air is more desirable than turbulent flow. A velocity pressure is detected, from which air speed is determined. A bouncing ball in the instrument's air tube indicates the velocity reading. Although relatively inexpensive, these flow meters provide accurate, if fluctuating, readings.



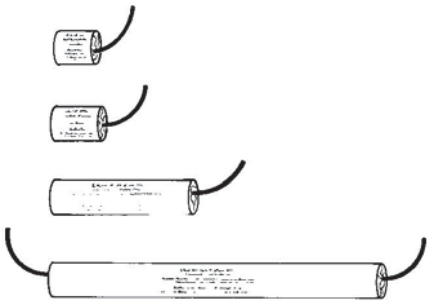
Velocity manometer

AIR FLOW VISUALIZATION

It is helpful to see where air is mixing or forming dead zones that influence animal comfort. Unusual air leaks may affect the operation of a ventilation system. Visualizing streamline patterns in livestock buildings has some limitations, but several methods have worked. Devices that generate ***smoke*** are the most common and come in gun, stick, candle, and bomb formats, with an increasing amount of smoke, respectively.

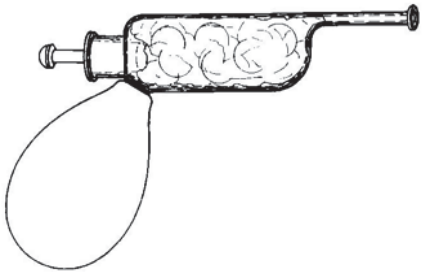
Smoke candles are rated according to their duration and volume of smoke they produce. A common beehive smoker provides an inexpensive diagnostic tool for local air flow effects. Smoke bombs have been used, but the abundant smoke quickly obscures air flow patterns and is an irritant to confined animals. Animals should not be present if harmful techniques are used, but since the presence of animals usually affects how air flow patterns develop under normal housing conditions, animal removal may provide unrealistic air flow patterns. It is best to keep the animals in place and use compatible air flow visualization methods. The above smoke devices combustion to produce smoke, so they also generate heat. This thermal effect tends to produce rising smoke.

Smoke sticks and guns use chemical reactions to produce smoke, so they exhibit few thermal effects. Smoke sticks produce the equivalent of three cigarettes' smoke and look like glass tubes filled with cotton. They produce smoke for ten minutes once the end is broken off with pliers. A smoke gun or puffer (a plastic bottle with a cap on the tip) provides small smoke puffs. This allows smoke to be produced intermittently, rather than the unstoppable stream provided by the combustion devices. A rubber bulb on the handle of a smoke gun provides smoke in puffs or continuous stream. The disadvantage is that the small amount of smoke dissipates quickly and may not photograph well. Smoke and stored sticks are irritating and corrosive. Also rubber parts of the smoke gun may deteriorate from chemical corrosion.



Smoke Candles

Smoke Sticks

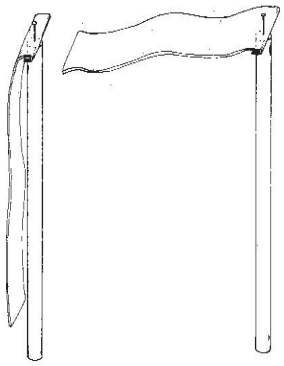


Smoke Gun

Very small, neutrally buoyant soap ***bubbles***, constructed with helium and compressed air, can last long enough to show airstreams within an enclosure. Bubbles are surprisingly durable in a free airstream but will not tolerate many impacts with obstructions. The apparatus used to generate bubbles is cumbersome and expensive compared to other air flow visualization devices.

Children's soap bubble toys can be useful in faster-flowing airstreams but are not neutrally buoyant. The bubbles exhibit downward gravitational effects which may not represent true air flow.

A set of ***air speed streamers*** may be used to detect air speed at various locations in a building. Threads of material or ribbons, such as string or plastic tape, can be “calibrated” to a size which blow horizontally at a particular air flow of interest. These inexpensive tiny posts with attached free-to-spin streamers can be positioned in many locations as indicators of the “calibrated,” desired air flow and direction. As conditions are changed in a livestock building, a quick survey of the streamers will indicate which areas are receiving desirable air flow. For example, a mechanical ventilation system inlet air speed of 700 fpm or faster is desirable. Streamers which have been "calibrated" to blow horizontally at 700 fpm are positioned at various inlet locations to observe whether inlet air speed is at least 700 fpm.



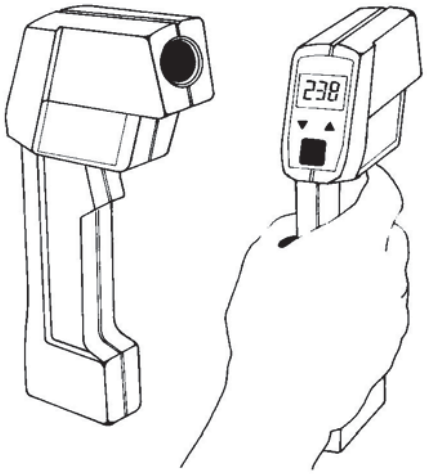
Inadequate **Adequate**

Streamers showing inadequate (left) and adequate (right) air speed

SURFACE TEMPERATURE

In cases where large differences in temperature exist between the animal environment and surrounding surfaces such as walls, ceiling, and floor, determine the radiant temperature, or surface temperature, of those surfaces. Surface temperatures have a strong impact on animal comfort, yet often are ignored in environment analysis. A hot ceiling temperature, from the summer sun, for example, can provide a large radiant load on the enclosed animals. This load would not be detected by a regular, dry bulb air temperature measurement. Surface temperature measurements will indicate ceiling areas with poor insulation. Similarly, very cold surrounding surfaces can make animals feel chilled even though the air temperature seems adequate.

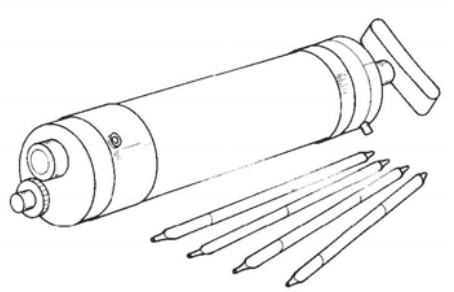
Radiation is a very strong form of heat transfer, yet is purely a surface phenomena that can be characterized by an object's surface temperature. An object must “see” another surface in order to feel its radiant heat transfer effect. “Line-of-sight” is a straight, unobstructed pathway where radiant energy wavelengths can travel. Animals in enclosures will be influenced by temperatures of the surrounding walls, ceiling, and floor even though they have limited or no contact with these surfaces. Even a surface outside the barn can cause heat stress if the enclosed animals can “see” it. For example, a black asphalt pavement may heat to 200°F on a sunny day. This surface adjacent to a curtained, naturally-ventilated freestall dairy may affect cow comfort when the curtains are completely opened, since there is a clear radiant heat transfer sight line between the cow and the hot surface.



Infrared Thermometer

An ***infrared thermometer*** measures surface temperature. This is a line-of-sight instrument and detects the radiant temperature of object(s) it can “see.” Readings are calibrated, or zeroed, on a black disc which is at the same temperature as the air temperature in the enclosure being evaluated. Infrared thermometers look like a hand-held hair dryer with a small, circular sensing element that is aimed at a surface. It does not touch the surface, but it detects the wavelength of thermal energy emitted from that surface, which is displayed as a radiant temperature. The instrument’s field of view widens with increasing distance between the object of interest and the instrument. Therefore, be sure that it is not also detecting adjacent surfaces. Small objects will require having the instrument close. A large object, such as a ceiling, can be evaluated while standing several

feet away at floor level. Be sure to evaluate surfaces that the animals "see" from their enclosure.



Gas Sampler Pump and Detector Tubes

GAS LEVELS: Ammonia, hydrogen sulfide. A portable and relatively inexpensive way to detect gas levels is with a hand-held ***sampler pump***. This manually operated, piston-type pump draws an accurate sample of ambient air through a ***detector tube***. It is very important to hold the pump so the air pulled in through the detector tube comes from the location of interest; this means holding it near the floor during the sampling period for floor-level measurements. Remote sampling is possible for hard-to-reach areas.

The thin glass detector tube is specific to the type of gas that you are measuring. For example, if ammonia is a concern in veal calf housing, a detector tube filled with an ammonia-sensitive material would be attached to the pump. The contents of the tube react with the air contaminants and change color. The length or shade of the color change in the detector tube indicates the concentration of gas in the sample. Tubes come in a choice of measurable ranges so that accurate analysis is possible. For example, one manufacturer offers ammonia detection tubes in 2-500 parts per million (ppm), and 20-1000 ppm ranges. Each tube is used once to obtain a reading and then discarded.

Dozens of gas- and vapor-specific detector tubes are available, including ones for ammonia, hydrogen sulfide, carbon dioxide, and carbon monoxide. Several types of sampling pumps are available, such as a design with rubberized bulb that is squeezed for sampling. The pump and detector tubes must be compatible. As with other instruments, the pumps need to be periodically checked for leakage and calibration.

DUST

Dust is the most difficult environmental parameter to measure and the appropriate equipment is quite expensive. Dust particles need to be separated by size to determine the respirable portion. This dust goes directly to the lungs and contributes to animal and human health problems. Dust, in general, is detrimental to animals, workers, and equipment with moving parts. Air samples may be taken and submitted to a lab where a cascade impactor, or similar device, is used to determine dust levels in a range of sizes.

Summary

Determining air characteristics in livestock housing environments allows us to evaluate problems and their potential causes. This is the first step in correcting any problems that are detrimental to production. A healthy and comfortable indoor environment will lead to productivity gains for livestock. By quantifying air characteristics such as temperature, humidity, air speed, and contaminant levels, we can see where we are falling short of optimal conditions. Changes in management and environmental conditions are the next step. Then air quality can again be quantified for comparison. Progress in improving the environment can be determined and animal health and comfort changes documented.

Each air quality characteristic, such as temperature, humidity, air speed, and flow pattern, can be measured in more than one way. The cost of instruments often is weighed against the accuracy of readings.

Certain instruments are appropriate only for specific applications. Best readings are obtained when the basic principles of how the instrument detects an environmental characteristic are understood. Proper technique will minimize human impact on the air being measured. This fact sheet has outlined many features of commonly used instruments. Part 1 of this fact sheet series explored the *Principles of Measuring Air Quality*, while Part 3 covers *Evaluating Mechanical Ventilation Systems*.

Periodic checks on environmental conditions, with instrument readings, are a supplement to the everyday observation of building conditions, animal behavior, and production records.

OPPORTUNITIES FOR AUTOMATION

Chart recorders and data loggers are available for periodic air temperature and humidity reading and recording. Thus, data may be collected over time and analyzed later for environmental comfort factors. Chart recorders are affordable but require manual data analysis. More sophisticated and convenient, computer-compatible data logging adds considerably to cost but is worthwhile for large data collection. Some ventilation system controllers can provide environmental data collection

.

WHAT TO DO WHEN NO ANEMOMETER IS AVAILABLE?

Since anemometers are specialized and relatively expensive instruments, the use of crude air velocity measurements may be necessary. These crude measurements, even when performed carefully, offer only an "adequate" or "inadequate" evaluation of the measured air flow. A smoke stick, watch, and a measured distance will allow an estimate of low air speeds. The time it takes smoke to travel a distance can be converted to air speed (feet per second, etc.)

For faster air speeds, such as in tunnel ventilation, near an inlet jet or fan exhaust, a pre-calibrated ***air speed streamer*** can determine if air speed is at least minimally adequate. When the streamer is known to blow horizontally at a desired air speed, it can be positioned in an air stream and its streamer orientation observed.

For a copy of our Fact Sheet listing contact:
Agricultural and Biological Engineering Extension
246 Agricultural Engineering
University Park, PA 16802
(814) 865-7685 FAX (814) 863-1031

Table 1. Instrument costs and suppliers. Fall 1995

Instrument	Measures	Cost*	Animal Envir. Spec.	Cole Parmer	Davis	Grainger
Thermometer	dry bulb temperature	$15-50		X		X
Max-Min Thermometer	dry bulb temperature	$20-50	X	X	X	X
Sling Psychrometer	dry & wet bulb temperatures	50		X	X	X
Aspirated Psychrometer	dry & wet bulb temperatures	$150-300		X	X	
Hygrometer	humidity (and dry bulb temperatures)	$40-60 (±5-7% accuracy)	X	X	X	X
		$275-350+ (±1-3% accuracy)	X	X	X	X
Hot-wire Anemometer	air speed	$400-1000	X	X	X	X
Vane Anemometer	air speed	$150-400+	X	X	X	
Velocity Anemometer	air speed	$16-20	X			X
Smoke Gun	visualize air speed	$100 + refills	X		X	
Smoke Sticks	visualize air speed	$3-22 each	X	X	X	
Infrared Thermometer	radiant surface temperature	$300-2600	X	X	X	X
Gas Sampling	noxious gas levels	$350 + $3.50/tube	X	X	X	
Manometer	static pressure	$40-100	X		X	X
Strobe Light	fan rotation (rpm)	$500-700		X	X	X
Tachometer	fan rotation (rpm)	$200-300		X	X	X

*Price ranges reflect instruments suitable to agricultural applications. Higher priced instruments have improved accuracy and more features than lower priced models.

Animal Environment Specialists
7870 Olentangey River Rd.
Suite 300
Columbus, OH 43235
1-800-969-0114

Cole Parmer
7425 North Oak Park Ave.
Niles, IL 60714
1-800-323-4340

Davis Instruments
4701 Mt. Hope Dr.
Baltimore, MD 21215
1-800-368-2516

Grainger
431 Amity Rd.
Harrisburg, PA 17111-1000
717-561-8322 (and many locations nationwide)

PSU 12/95

PENNSTATE
College of Agricultural Sciences Cooperative Extension
Agricultural and Biological Engineering

Evaluating Mechanical Ventilation Systems
Evaluating Livestock Housing Environments

Part 3 of 3

Eileen Fabian Wheeler, Assistant Professor
Rob4ert Bott4cher, Professor, North Carolina State University

Characterizing a Mechanical Ventilation System's Performance

When people think of air quality in an animal environment, they often think of the ventilation system. This makes them eager to take measurements of fan performance and inlet characteristics. Air exchange and air distribution are the main concerns. Air speed at the fan and inlets can be measured to get the necessary information to calculate the capacity of the ventilation system. The static pressure against which the system is operating can be checked. Fan performance can be verified. Evaluate the system under typical animal density and weather conditions.

Although the ventilation system's performance is important, conditions in the area occupied by the animals are even more important. The ventilation system will influence conditions within the animals' space, so environmental measurements should be made along with observations of animal behavior. For example, in some cases the ventilation system may appear to be working correctly and within its design specifications, yet air quality in parts of the animal facility is unacceptable.

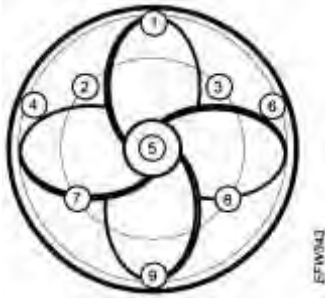
This fact sheet series also contains Part 1, Principles of Measuring Air Quality, which outlines how to take proper air quality measurements, and Part 2, Instruments for Measuring Air Quality, which describes instruments used for characterizing the environment in the animal zone.

Fan Air Speed

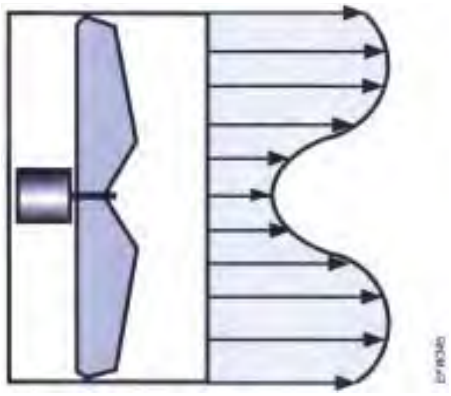
Fast air speed at the discharge or entry into a fan can be measured with a vane anemometer. Many readings should be taken across the face of a fan, as shown below, to get an average air speed. Because this is a rather crude field measurement, include as many readings as possible in your average air speed. Use the nine readings shown in the figure as a minimum.

Vane Anemometer

Each measurement represents only a very small area of air flow over the fan face. Air speed varies greatly across the face of a fan, with highest velocities coming off the blade tips and minimal velocity near the hub. Sample velocities near the blade tip, in the middle, and at the center of the fan. Some fans will have negative air flow at the center, indicating a draft of air short-circuiting backwards through the fan. Obstructions and wind gusts cause uneven air speed distribution over the fan face. A hooded poultry house fan will exhibit lower air flow at the top quadrant of the fan due to the resistance of the external hood, which is open at the bottom. Air speeds are more accurately determined on the discharge side of the fan than on the inlet side.



Take air speed measurements at several locations across the fan area.



Cross section of fan showing large variation in air speed coming off fan tips versus near fan hub.

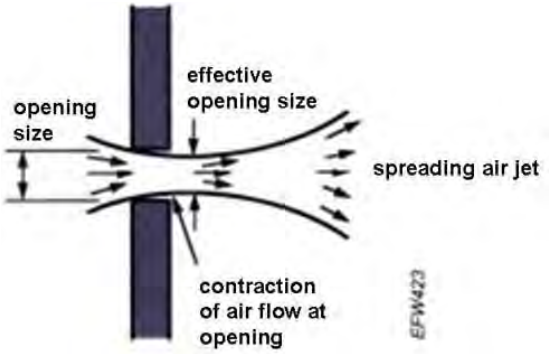
It is important to minimize the amount of air flow that your body blocks as you position the anemometer. Step back out of the air flow, to the side of the fan when possible. Vanes that attach by cable to the air speed display unit offer an advantage here. Several instruments are appropriate for measuring the fast air speeds exiting a fan, including a velocity manometer, vane anemometer, hot-wire anemometer, or air speed streamer (see Part 2).

Inlet Air Speed

Air speed from inlets should be quite fast, between 700 and 1000 ft/min, in a properly operated mechanical ventilation system. Unfortunately, the inlet gap of a slotted or baffle inlet is often so small, at ¼ inch to 1 inch wide, that the large 3-inch diameter head of a typical vane anemometer cannot determine a meaningful air speed. The small probe head of a hot wire Anemometer is most appropriate for measuring air speed out of slotted inlets. A vane anemometer can be used to measure air speed out of some duct holes (rigid or polytube ducts) or other inlets with large openings. The key is to make sure the vane anemometer head is no larger than the air stream being measured.

Hot Wire Anemometer

Small-headed vane anemometers can measure smaller diameter airstreams. The low-cost air velocity manometer may be used with these fast inlet air speeds.



Correction of edge effect for air flowing through holes involves reduced effective opening area.

Air speed from slotted inlets is not uniform over the vertical cross section of the inlet. The air speed will be zero at the edges of the inlet and will typically increase to its maximum near the middle of the inlet opening. Take air speed measurements across the vertical opening of the inlet until you get a maximum air speed reading, then correct for the edge effects by using a concept called the “coefficient of discharge.” This has been empirically determined to be about 0.6 for sharp-edged openings such as ventilation slots, holes or windows. The real inlet air speed is the maximum measured air speed multiplied by the coefficient of discharge of 0.6. In other words, the average air speed over the face of the entire inlet opening is 60 percent of the maximum speed you measured.

Capacity of Ventilation System

To calculate the air volume being moved by a ventilation system, you will need a measured air speed and an estimate of cross-sectional area through which that air is moving. Air speed involves measurements at the fan and/or inlets. To determine cross-sectional area, measure the fan wall opening(s) or the sum of inlet areas. It is easier and better to determine ventilation capacity by taking measurements at the fan. Inlet air speeds may seem easy to measure, but the effective inlet area and average air speed are not as easy to determine. Particularly with long slotted inlets, construction irregularities will mean that small openings such as 1/4 inch cannot be maintained along the length of the slot. In polytube or other ducted inlets, air velocity in the duct and at the holes will vary with the distance along the duct, so many measurements will be

needed. Even tightly constructed buildings have some “unplanned” inlets for air exchange, and these are very hard to account for.

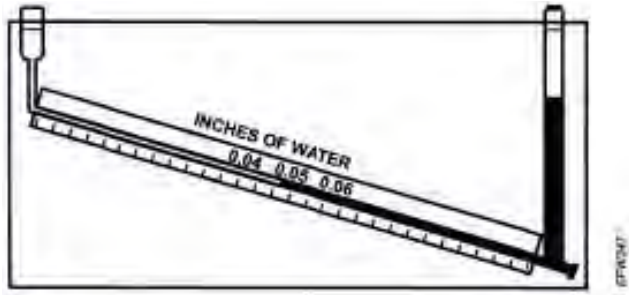
Use this very simplified method to calculate air flow capacity of a fan in cubic feet per minute (cfm): multiply the average air speed you measured in feet/ minute (fpm) by the area of the fan face in square feet. (Area of circle =π $d^2/4$; where d = diameter in feet). Example: you calculated an 800 ft/min average air speed across the face of a 48 inch (4 foot) diameter fan. Air flow (cfm) = speed (fpm) * area (sq ft) = 800 fpm*$\pi(4)^2/4$ sq ft =10,048 cfm.

The ventilation system capacity equals the sum of all fan capacities. For each type of fan in a staged ventilation system, one set of representative data may be used. For example, in a poultry house with banks of 36-inch and 48-inch fans, determine an average velocity reading from one (or two or three) of the 36-inch fans and one (or two or three) of the 48-inch fans. Total ventilation capacity at any stage would be estimated as the measured average air flow capacity of a 36-inch fan times the number of 36-inch fans operating plus the average air flow capacity of a 48-inch fan times the number of 48inch fans operating.

When there are differences in fan types due to manufacturer, motor, blades, maintenance, or suspected reliability, air speed measurements will need to be taken for each different type of fan. Fans in locations where obstructions or wind effects are dominant features also will need to be evaluated separately. There is no need to measure air flow at each and every fan unless an unusual air flow imbalance is suspected.

Static Pressure

Static pressure is very important to a mechanical ventilation system since it is the driving force for air movement. Air enters or leaves the building because the interior static pressure is different than the outside pressure. Static pressure is measured with a manometer, which determines the pressure difference between the ventilated space and the building exterior. The exterior is anywhere outside the mechanically ventilated livestock confinement that is exposed to outside air conditions. The manometer has one port open to the building interior. The second port is connected to a flexible hose which has its open end positioned outside the ventilated space. The manometer then measures the static pressure difference that influences air entering the inlets.



Inclined manometer

Inclined manometers are the most accurate manometers for agricultural ventilation situations. A colored fluid in a thin tube equilibrates to a position representing the pressure difference between the two measuring ports. Units are in fractions of an inch of water. Static pressure differences in agricultural ventilation are so small, on the order of 0.02-inches to 0.10-inches water, that an inclined rather than upright manometer is needed to accurately determine a scale reading.

Care must be taken in positioning the tubes connected to the measuring ports. Be sure they are not exposed to any moving air. The objective is to measure a “static” pressure of air and not the “velocity” pressure of moving air. The exterior measuring port often is placed in the building attic, which represents an outside condition without wind effects. The interior port should be kept away from high air velocity areas such as near the fans or inlets.

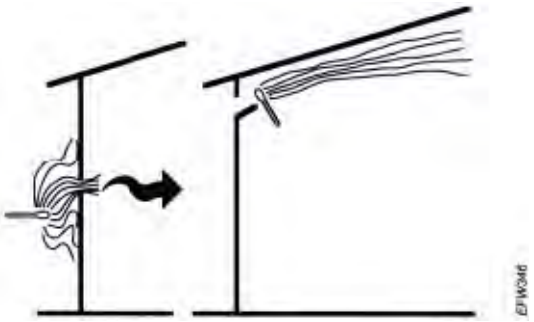
Ventilation system controls often operate by measuring the static pressure difference across the inlets. This measurement can be verified as discussed above. Ventilation fans actually operate against more pressure drop than that associated with just the inlets. They also have a pressure drop in exhausting air through the fan enclosure restrictions, including the fan housing, guard and any louvers. (This pressure change is almost impossible to measure under field conditions.) Fans are chosen for operating performance at 0.10-inch to 0.125-inch (1/10 inch to 1/8 inch) water pressure to account for fan enclosure and inlet restrictions.

Evaporative cooling pads or other air restricting devices (heat exchangers, earth tubes, ducts) will offer additional resistance to air flow. Additional manometer readings should be taken when each source of air flow resistance is being used. This “total” static pressure is used for comparing actual versus expected fan performance. For example, a ventilation system may be set to operate at 0.04-inch static pressure for part of the year. This control setting

represents the static pressure difference across the inlets. The pressure difference with an evaporative cooling pad in place will be higher. A new measurement may find the static pressure the fan is operating against is 0.08-inch water. Fan capacity, as shown on a fan characteristic curve, would have to be evaluated around 0.14-inch water to account for inlets, evaporative pad and fan restrictions.

Air Flow Visualization

Sometimes it is helpful to see where air mixing or unusual leaks are occurring in a ventilation system. It may be surprising, but not uncommon, to learn that a good portion of air flow in the enclosure is coming through unplanned inlets. These may include leaks around the fan installation, broken window panes, leaks around door and window frames, broken siding materials, and any other location of loose construction detail. These significant leaks are very detrimental to performance of the ventilation system. Unplanned inlets are not controllable and probably provide uneven air flow patterns, in turn creating uncontrolled and uneven air quality conditions around the building interior.



Air flow visualization by positioning smoke devices

An improperly operated ventilation system will have adequate air flow in volume as measured at the fan, but not in distribution throughout the enclosure. It is the inlets and their resultant air flow distribution that create desirable air conditions within the animal area. Fans provide a motive force (the pressure difference) to keep a volume of air moving through a building at a certain rate, but it is the inlet system that distributes fresh air. Air flow visualization will provide information about whether fresh air is being distributed to the animal areas where it belongs.

Visualizing air flow patterns in livestock buildings has a few limitations, but several methods have worked. Thermal or chemical smoke can be used, but anything which produces abundant smoke can quickly obscure air flow patterns. Very small, neutrally buoyant soap bubbles, generated with helium, can last long enough to show airstreams within an enclosure. Threads of material can be calibrated to blow horizontally at a particular air speed and positioned inexpensively in many locations as indicators of minimum desired air flow. Air flow visualization instruments and their use are covered in Part 2, *Instruments for Measuring Air Quality.*

A certain amount of creative license is allowed in using air flow visualization. A visualization tool such as a smoke candle can be placed just outside (or just inside) an inlet to see how far the air jet is penetrating into the animal enclosure. Similarly, a smoker can be positioned around close to the exterior of a building to see where smoke is drawn through building leaks. Smoke sticks can be held down into an animal pen to look for drafts or dead air zones. Using common sense to identify where leaks and trouble spots may be occurring will lead to appropriate positioning of the air visualization equipment. Pure curiosity is allowed! Move around with the instruments and look for unusual air flow patterns. Sudden, dropping drafts of air may be caused by temperature and/or velocity changes. Look for obstructions and use other instruments to help determine causes for the air flow observations.

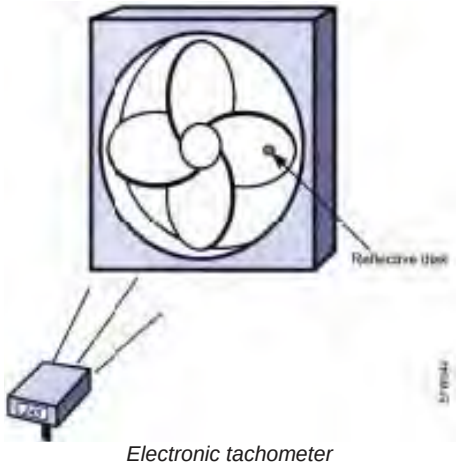
Fan Speed (rpm)

Fan operation can also be checked by measuring the fan blade rotational speed in revolutions per minute, or rpm. Because the amount of air a fan moves is directly proportional to its rotational speed, a fan running at 75 percent of its rated speed will move only 75 percent of its rated or intended air flow.

Fan speed measurement can quickly indicate if belts are loose or worn, or if the voltage level is too low. Inadequate wiring can lead to substantial voltage drops along the building length, causing fans to run slowly. Measuring fan speed is as important as other performance indicators, particularly for belt-driven fans, which can slip with worn or poorly-adjusted belts.

Fan rotational speed can be measured using a tachometer or strobe light. **Tachometers** can be either mechanical or electronic. With mechanical tachometers, the tachometer shaft is rotated by pressing it against the center of the fan shaft so that both the tachometer shaft and fan shaft have the same speed. Mechanical tachometers should be used carefully so that no personnel or

equipment damage occurs if the tachometer shaft slips off the fan shaft.
Electronic tachometers (like the one in the figure) send light to a shiny, rotating object, such as a silver sticker attached to a fan blade or shaft, and the reflected light is measured by the tachometer and converted to an rpm measurement.



Electronic tachometer

A **strobe light** produces flashes of bright light at an adjustable frequency (flashes per minute). As the frequency approaches the fan rpm, the blades appear to slow down, stop, and may even appear to reverse direction. The fan rpm is determined by adjusting the flash rate until a rotating part (blade, shaft, or pulley) appears to be stopped.

It is important to note that simply adjusting the flash rate until the fan blades appear to be stopped does not ensure an accurate reading because the same blade may not be in the same position at each flash. For example, with a four blade fan, running the strobe at 3/4 or 1 1/4 times the correct flash rate will appear to stop the blades, but a given blade will not be in the same position with each flash. The correct strobe flash rate and rpm can be obtained by stopping a unique rotating part, such as an oil fitting, bolt, or key shaft on the shaft, or a shiny sticker that is half black and half shiny placed on the fan shaft.

Summary

Evaluation of a mechanical ventilation system emphasizes measurements of air exchange capacity (fan air speed) and air distribution (inlet air speed and air flow visualization). Ventilation system capacity is best measured at the discharge side of fan(s) by determining an average air speed over the face of the fan. Multiply average air speed (ft/min) by the area (square feet) of the fan face to determine capacity in cfm. Fast inlet air speed encourages good air mixing and distribution.

When environmental problems are suspected, techniques such as air flow visualization can help identify trouble spots. Static pressure and fan speed (rpm) measurements can help pinpoint causes of poor performance.

The environmental conditions under which animals are housed are very important to their comfort and productivity. With the tools and methods outlined in this fact sheet series, one can better understand and characterize the environment to which the animals are exposed. Part 1, Principles of Measuring Air Quality, emphasized how reliable measurements are obtained. Instruments needed to make appropriate measurements in agricultural environments are described in Part 2, Instruments for Measuring Air Quality. Proper techniques for using each instrument have been emphasized. Once good measurements are taken, comparisons can be made to desirable environmental characteristics. Part 3, Evaluating Mechanical Ventilation Systems, highlights how to use instruments and observations to evaluate air exchange capacity and air distribution.

Additional Resources

Environmental problems are much easier to solve once you have good background information about where the major problem is located. Changes in management, ventilation system operation, or equipment then can be made. Environmental improvements can then be quantified and compared to previous conditions.

Several publications can help solve environmental problems you may find. They include:

Pork Industry Handbook, T*roubleshooting Swine Ventilation Systems*.
Available from:
Media Distribution Center
Purdue University
301 S. 2nd St., Lafayette, IN 47901-1232

MWPS-32, *Mechanical Ventilating Systems for Livestock Housing*
MWPS-33, *Natural Ventilating Systems for Livestock Housing*
MWPS-34, *Heating, Cooling and Tempering Air for Livestock Housing*

The above publications are available from:
MidWest Plan Service http://www.mwpshq.org/
Email: mwps@iastate.edu
Order Toll Free: 800-562-3618 or 515-294-4337
FAX: 515-294-9589

For a complete listing of Penn State Agricultural and Biological Engineering fact sheets please check
http://www.abe.psu.edu/extension/informationindex.html
246 Agricultural Engineering Bldg. University Park, PA 16802
(814)865-7685
FAX (814)863-1031

PSU 1st Edition 12/95

From: ELISABETH MONAHAN
To: Regina Kokkinis
Subject: BACKYARD CHCIKENS
Date: Tuesday, September 1, 2020 8:45:14 AM

Good Morning-

I have recently become aware that Municipal Services is considering adding into the chicken ordinance that the coop and run need to be fenced in on three sides with a 6 foot privacy fence. I am strongly opposed to this. Good airflow and adequate sunshine is necessary for healthy chickens. No other towns have this regulation designed solely to block the view of coops from neighbors. This addition to the ordnance could be considered cruelty to animals. Will dog owners be forced to put up a privacy fence around their dog houses and runs because I don't want to see them? No. Will parents of be forced to put up 6 foot privacy fences around their children's playgrounds or pools because I don't want to see them? No. Will gardeners be forced to put up 6 foot privacy fences because I think only grass should be grown in their yards? NO.
I do not want a privacy fence in my backyard. I think you will find everyone who owns chickens in Darien will be against this addition to the ordinance. Why is Darien creating such an unprecedented rule about hiding chicken coops from view of neighbors because ONE neighbor is complaining about a corner lot coop.

I am all for regulations, but telling us our beloved pets and their living quarters need to be hidden from sight in our own backyard is outrageous. If Darien expects this of chicken owners, then dog owners need to have 6 foot fences too. Any shed or playground or garden that is not to my particular liking should have a 6 foot privacy fence around it too. This seems to be an extreme measure effecting an entire town to appease one cranky neighbor in the Seminole neighborhood.

I moved to Darien because they allowed chickens, I am extremely disappointed that Darien is now considering making me hide my pets in my own yard as if they are not worthy of being seen. very sad. Everyone has their own opinions on what is beautiful and what is not. It should not be up to Darien to make me hide my beautiful coop. What if someone complains about my house color or my choice of flowers in my garden, or what style of playground my kids pay on, will Darien regulate those as well, because if all it takes is one complaint, to set unusual and drastic ordinance, then this is not the Darien I want to live in.

Elisabeth Monahan.
1938 Manning Road.

From: Elisabeth Monahan
To: Regina Kokkinis
Subject: Re: BACKYARD CHCIKENS
Date: Tuesday, September 1, 2020 9:53:53 AM

I would also like to add...
Why is Minneapolis the largest city in MN with a population of 430,000 being used a reference for chicken legislation in Darien IL population of 22,000? Seems hand picked as no other cities or suburbs in Illinois have this fencing regulation.

> On Sep 1, 2020, at 9:39 AM, Regina Kokkinis <rkokkinis@darienil.gov> wrote:
>
> Good Morning,
>
> Thank you for your interest in the City of Darien.
> Your comments have been received and will be included in the packet provided to Council.
>
> Thank you,
>
> *Regina Kokkinis*
> Administrative Assistant, Municipal Services
> City of Darien
> 630-353-8105
> **To receive important information from the City of Darien sign up for our electronic newsletter:**
> **DARIEN DIRECT CONNECT**
> **Follow the link and subscribing is simple!**
> https://darien.il.us/reference-desk/directconnect-enews
>
> ---
>
> **From:** ELISABETH MONAHAN <lizzy.monahan@[redacted]>
> **Sent:** Tuesday, September 1, 2020 8:45 AM
> **To:** Regina Kokkinis <rkokkinis@darienil.gov>
> **Subject:** BACKYARD CHCIKENS
>
> Good Morning-
>
> I have recently become aware that Municipal Services is considering adding into the chicken ordinance that the coop and run need to be fenced in on three sides with a 6 foot privacy fence. I am strongly opposed to this. Good airflow and adequate sunshine is necessary for healthy chickens. No other towns have this regulation designed solely to block the view of coops from neighbors. This addition to the ordnance could be considered cruelty to animals. Will dog owners be forced to put up a privacy fence around their dog houses and runs because I don't want to see them? No.

Will parents of be forced to put up 6 foot privacy fences around their children's playgrounds or pools because I don't want to see them? No. Will gardeners be forced to put up 6 foot privacy fences because I think only grass should be grown in their yards? NO.
I do not want a privacy fence in my backyard. I think you will find everyone who owns chickens in Darien will be against this addition to the ordinance. Why is Darien creating such an unprecedented rule about hiding chicken coops from view of neighbors because ONE neighbor is complaining about a corner lot coop.

I am all for regulations, but telling us our beloved pets and their living quarters need to be hidden from sight in our own backyard is outrageous. If Darien expects this of chicken owners, then dog owners need to have 6 foot fences too. Any shed or playground or garden that is not to my particular liking should have a 6 foot privacy fence around it too. This seems to be an extreme measure effecting an entire town to appease one cranky neighbor in the Seminole neighborhood.

I moved to Darien because they allowed chickens, I am extremely disappointed that Darien is now considering making me hide my pets in my own yard as if they are not worthy of being seen. very sad. Everyone has their own opinions on what is beautiful and what is not. It should not be up to Darien to make me hide my beautiful coop. What if someone complains about my house color or my choice of flowers in my garden, or what style of playground my kids pay on, will Darien regulate those as well, because if all it takes is one complaint, to set unusual and drastic ordinance, then this is not the Darien I want to live in.

Elisabeth Monahan.
1938 Manning Road.

From: Heather Conroy
To: Dan Gombac
Cc: Tom Belczak; Regina Kokkinis; Joseph Hennerfeind
Subject: Re: Village 8/17/20 Presentation-Chicken/Egg Raising
Date: Tuesday, September 1, 2020 3:01:28 PM

Hi Dan

A quick search on ventilation and chicken housing will bring MANY articles on it.

Most of us chicken owners use natural ventilation, meaning, open air/space without any barriers; so that there can be a breeze/circulation/air flow. Let me be clear, chicken coops and runs are referred to as poultry houses, as the first PDF talked about. My main concern is based on property lines and houses, which seem to vary around here, and how close the required fence or barriers will have to be to the coop. Some houses will be ok, some not. My other concern is the burned of time and money put on chicken owners and not other owners....like dog owners. Also, Darien was a farming town.

Some links can be found on ventilation by clicking this link:

https://www.bing.com/search?q=ventilation+and+chicken+runs&qs=n&form=QBRE&sp=-1&pq=ventilation+and+chicken+runs&sc=2-28&sk=&cvid=E6BBCF78A3CB407EA84B47C12A405F31

This is a great article as well as the ones in the list through the link above.

https://www.roysfarm.com/poultry-housing/#:~:text=Well%20ventilation%20inside%20poultry%20housing%20system%20play%20a,Most%20farmers%20use%20natural%20ventilation%20for%20poultry%20production.

I would really have to research or have a chicken expert (yes, they have them) give me information or speak to you on the reasons why, but it is for the reasons I have already listed. Maybe they can explain them more or in detail to you. I have one, she is a business, so I would have to see if she could speak to you free of charge regarding why fences or barriers would be an issue.

Fences stop a breeze and airflow. That is what they are...a barrier. I don't see why that would be a law to have to have a fence or trees surrounding the chicken enclosure. This would be an issue and not having other pets, such as a dog.... which could be dangerous and deadly depending on the dog if the leash were to break, are not required to have fences or barriers. I have seen dogs in Darien with no leash outside on their property or in the backyard with no fence. This fence is for what purpose if the chickens are already in an enclosure? Is it for Aesthetics only? What is the purpose of the fence/tree barrier? I wouldn't have so much of a problem with this if a fence or barrier was required for other pet owners.

I would however still argue the ventilation issues and that they are already in an enclosure. If this is only for Aesthetics, then whose opinion is that of? And does that opinion represent the majority of Darien residents. I could put together with the help of others I know, a poll to see what other residences feel about the situation of having a chicken coop visible or not and if that should be a law. I would think the village could create a survey for the community on this issue as they have done for others. Personally, I would love to walk around and see people's gardens, chickens, etc. And I actually do! I know others in Darien that agree with me on this one.

When you start to say put up a fence or barrier, what's to say you can't still see it through openings or over the top of the fence? What are the specifics on the fence as in Aesthetics? What if people have a funky color paint? Signs on the fence? Pictures on the fence? In other words, where does the Aesthetics line get drawn and who is calling the shots on that? Is this what the majority of Dairen residences want (opinions) or is this piece of the law for only a handful of certain residents and their "standards". I would really like to see a survey on this since it seems to me there is no physical reason for the fence or barrier. Actually, if anything, this makes me think dog owners should be required to have one. There are houses I have personally seen that have large breed dogs and only an "Invisible fence" electric fence (which I actually am afraid of walking by).

This is coming down to a level of “I don't like seeing what is in your yard” based on one’s personal opinion.

Having the number of chickens and feet from property lines, that I can see. If it isn't visible how do you confirm if there is a compliance issue? I know we are agreeing to property inspection if there is a viable complaint, but a locked fence wouldn't allow easy access or ease of just driving by and seeing something not in compliance.

For all these reasons, I do not want a fence or barrier law and I think that can open up a whole other can of worms. I do believe a law should have the majority of the community's opinion on something like this, especially for a forced purchase on the owner... as well as time. With that, I would like to see a survey on the fence or barrier piece of the ordinance. We are already doing things other pet owners do not have to do with certification and agreeing to those terms, number of hens, feet from property, and max on enclosure. I could create a survey through online groups, or maybe this is something the village can do and we can make sure we get it out there.

The other option would be, not to make a fence or barrier part of the ordinance.

With that you have the support of a majority of the community I believe, but a survey would have to prove that theory.

Sincerely,
Heather Conroy

On Tue, Sep 1, 2020 at 11:04 AM Dan Gombac <dgombac@darienil.gov> wrote:

> Hi Heather,
>
> I have read through your PDF on ventilation and the document cites air ventilation specifically to poultry houses. Please forward the verbiage that relates to ventilation of chicken coops.
>
> Sincerely,
>
> *Daniel Gombac*

Director of Municipal Services

630-353-8106

To receive important information from the City of Darien sign up for our electronic newsletter:

DARIEN DIRECT CONNECT

Follow the link and subscribing is simple!

https://darien.il.us/reference-desk/directconnect-enews

From: Heather Conroy <hconroy333@[redacted]
Sent: Tuesday, September 1, 2020 8:00 AM
To: Dan Gombac <dgombac@darienil.gov>
Cc: Tom Belczak <tbelczak@darienil.gov>; Regina Kokkinis <rkokkinis@darienil.gov>; Joseph Hennerfeind <jhennerfeind@darienil.gov>
Subject: Re: Village 8/17/20 Presentation-Chicken/Egg Raising

Hi Dan,

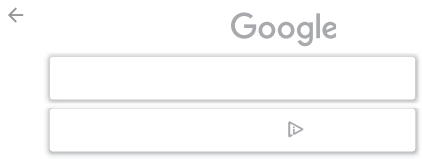
As for the ventilation, 3 six-foot walls would highly decrease ventilation. This puts the chickens at risk of overheating and even dying. I saw on other groups this past weekend some members lost chickens from overheating. Chicken owners purposely build structures with a lot of ventilation for this reason. Also, with less air flow that creates more possibilities for odor and flies to accumulate. You want as much air flow as possible. Many chicken owners will add fans to their runs to increase air flow for all of these reasons. I have attached some pictures for reference and can provide more from my local members if you need more. There is also good information in this PDF as well on ventilation:
https://afs.ca.uky.edu/files/chapter7.pdf

I dont think a fence should be required at all. It solves no problems and if anything will create problems as I described above. The chickens are in an enclosed run. This ordinance is directed to one current Darien chicken owner and only an issue because of a couple of complaints. Making a law for one person because of one other person is not a democracy. It is not Melissa's fault that her property is a corner lot. Her coop is in the backyard. A fence like this is not just and would only create more problems for both sides. Please allow this domestic dispute to stay out of law making.

As long as the chickens are secure in their enclosure, there is no functional purpose for an extra barrier. It doesn't eliminate the large structure or any other complaints that have been brought up. You also do not want to shade them as they need 14 hours of sunlight to produce. The trees are interesting, and I would like to know more about that idea...how far apart would they be? How much does one 6ft tree cost (I'm thinking a lot)? How many is sufficient for compliance? While I think that is an interesting option and would be better for ventilation... depending on location and property and lines, it could be shading the coop which we try not to do since they need so much sunlight. Shading the coop is not good for chickens, eggs, or bugs.

Sincerely

Poultry Housing



Suitable poultry housing is very important for successful poultry farming business. Poultry birds can be raised in both free range and indoor production systems. In case indoor production system, it is very crucial to manage the environment. Poultry need accurate management and environment for better production and welfare. Whether the poultry raised in indoor or outdoor system, make sure the well management, ventilation, lighting, temperature and litter condition.

For a small scale poultry production, portable houses are best and this is an organic method. But for sustainable commercial poultry production, planned and proper designed poultry housing is very essential to keep the poultry birds healthy and productive. And this will increase the farming production and income.

Keep a thermometer inside every poultry house for measuring the daily temperature, and always follow the weather forecasts.

Ventilation

Well ventilation inside poultry housing system play a very vital role to control the indoor environment. It removes moisture, heat, gas etc. and brings fresh air inside the poultry house. You can design ventilation system in both natural and artificial (mechanical) methods. Most farmers use natural ventilation for poultry production. In natural ventilation system, you can open wide windows and side curtains to ensure the entrance of fresh air to make the house cold during summer season (hot weather). A pair of vent in the roof of poultry house, will help to remove the hot air. A roof of at least six feet height from the floor, is suitable for this purpose. Controlling natural ventilation is more difficult than artificial method. In winter season, make proper ventilation system to preserve heat and remove moister and gas (like ammonia) from the house. Most farmer close the windows and side curtains during winter season, because warm air holds more moisture than cold air. However, you should allow small amount of air inside the house with high moisture once or twice a day. In artificial ventilation system you can fully control the movement of air inside the poultry housing system. But this system is not suitable for free range poultry housing.

Lighting

Light is also a vary important element for poultry farming. And poultry birds become very sensitive to light. Light helps the poultry birds to be productive, finding food and simulating them for reproduction. Besides light, the poultry birds also need dark period for keeping good health and producing melatonin hormone (which is very important for immune function). Almost all types of poultry birds require 8 hours of darkness period and 16 hours presence of light. Almost all poultry producer use only the natural light for lighting the poultry house. Darkness is helpful for some fast growing broiler species, and helps them for reducing leg disorders and build their body frame. However, poultry chicks require 24 hours light daily after hatching

for finding food and water pot. Some commercial broiler poultry producer use long lighting period to encourage the bird consuming more food. This results very fast growing of broilers. Broiler poultry birds do not eat food and drink water in the dark. If the poultry birds are kept in darkness for some moment, then they will be more active in the light than continuous lighting period (and they will eat more food). This is a good practice, and it keeps the poultry birds healthy. In accordance with natural lighting, you have to use artificial light. In small scale poultry rearing, you can use 14 to 16 hours of lighting period for layer poultry (where artificial lighting is needed for 4 to 6 hours daily depending on the season). But the lighting period should not be more than the longest day of the year. Maintain the lighting period for layer poultry farming very carefully, otherwise they will lay egg very soon or stop laying eggs. Use incandescent or fluorescent bulb for the purpose of artificial lighting. Fluorescent bulbs are very expensive than incandescent bulb. But fluorescent bulbs are very energy efficient and long lasting. However, use bulb according to your choice and demand. In the case of incandescent bulb use a 60 watt bulb for each 200 square feet area, and use a wide reflector always to maximize the light. Clean the bulbs regularly. You can use an automatic controller for maintaining a regular lighting period. Because if you forget to switch on the light manually, then it can hamper the egg and meat production of your poultry birds. Always use waterproof sockets inside the poultry housing system. Maintaining a lighting period inside the poultry house in morning is very effective than lighting in the evening. Adjust the lighting period according to the weather condition and season. Where there is no electricity or load shedding is very high, use batteries, heriken or solar panel for lighting the poultry house.

Litter

For successful poultry farming and getting desired production, litter management is very important. Usually the litter is used for covering the floor of poultry housing system which may be made of concrete, wooden or earthen. Litter absorbs the moister of closet and dilutes the manure. It also works as the bed for the poultry birds. Rice hulls and soft wood shavings are the common materials used by the farmers around the world. Besides this, you can use some other materials for litter making purpose such as recycled newspaper, sand, dried wood fiber, chopped pine straw, peanut hulls etc. Small scale poultry farmer also use some other materials such as hay and straw as poultry litter. Whatever you use, always try to use those materials which are healthy for poultry and compost well. A good litter contain about 20% to 30% moisture and depth about 2 to 4 inch. Ventilate the pulse very well, and it will help to remove moisture from the litter. High moisture in litter is very harmful for poultry health. Wet litter causes some problem like sores, and blister on poultry birds and produce ammonia gas which hampers the respiratory system of poultry. Use aluminum sulfate or hydrated lime to reduce ammonia gas

Environment

A good poultry housing system must have to be weather proof. Weather proof poultry housing system will keep the poultry birds safe from the adverse weather conditions such as cold, rain, wind, hot sun etc. The poultry housing system should have the facilities of providing warmth, particularly during brooding period and winter season. The house must have to be well ventilated. Must have to have the facilities of protecting the poultry birds from harmful predators. Different types of innovative poultry housing design are used in poultry farming business. It may be just a simple house, mobile or portable house or fixed houses with permanent foundation.

Temperature

An adult chicken contains about 105° to 107° Fahrenheit temperature in it's body. The chickens can maintain their body temperature and grow very well in a thermoneutral zone of 65° to 75° Fahrenheit. If the temperature is under or higher than this zone, then you must have to control the temperature in any way. Chickens reduce their food consumption rate in hot weather. They have no sweat glands. As a result, the growth of poultry will be less in hot weather condition. They begin panting at or above 85° Fahrenheit temperature. Drink water frequently to keep them free from dehydration. It is very difficult to combine between high temperature and high humidity, because in those conditions panting does not make the body of chicken cool. In some countries, hot weather is very harmful than cold weather. You must have to control hot weather strictly for broiler poultry farming, as they are very fast growing bird and can't tolerate high temperature. You have to keep sufficient cool drinking water inside the poultry housing, during summer season. During winter season, use heaters for heating the poultry housing system. Most of the farmers do not use heaters to heat the house and depend on the body warmth of poultry birds for heating. The poultry birds consume more feed in winter season, because they need more energy to keep their body warm and keep them free from cold. Most farmer provide the poultry more food instead of heating the house. Because feeding more feed costs less than heating the house. However, you can use electric heaters or gas brooders for the purpose of heating the poultry housing area.

from the litter. You can use the litter again and again after drying the materials properly. But don't use the used litter if any disease affect in the poultry farm. After selling the poultry, remove the used litter from poultry house by machine or hand. This litter can be used as a good manure in the agricultural land for crop cultivation. In some area poultry manure and litter is very valuable and an extra source of earning cash. Dry poultry manure contain 3.84% nitrogen, 2.01% phosphorus and 1.42% potassium. In a word, poultry manure is very suitable for make soil fertile and it can be used in organic farming system.

These are the common consideration for creating a suitable poultry housing system for your birds. Follow everything very carefully while making house for your birds. God bless you!

From: Dan Gombac
To: Regina Kokkinis
Subject: FW: Chickens???????
Date: Tuesday, September 8, 2020 2:22:38 PM

Please add to b/u for agenda.

Daniel Gombac
Director of Municipal Services
630-353-8106

To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: Joe Marchese <jmarchese@darienil.gov>
Sent: Tuesday, September 8, 2020 2:06 PM
To: WOSTRATZKY Millie <mwostratzky@[redacted]; Ted schauer <tschauer@darienil.gov>; Joseph Kenny <jkenny@darienil.gov>; Lester Vaughan <lVaughan@darienil.gov>; Thomas Chlystek <TChlystek@darienil.gov>; Mary Sullivan <MSullivan@darienil.gov>; Eric Gustafson <egustafson@darienil.gov>; Tom Belczak <tbelczak@darienil.gov>; Dan Gombac <dgombac@darienil.gov>
Subject: RE: Chickens???????

Mrs.. Wostratzky:

Thank you for taking the time to share your concern regarding this issue. While you have noted one specific situation, this issue impacts more than the two families you mention in your email. We have heard from residents who share opposing positions on this matter, and it is our intention to formulate an ordinance that takes these differing opinions into consideration.

Our Municipal Services Committee will be discussing this issue and examining several proposals at its Monday September 28 meeting to be held here at City Hall starting at 7:00 pm. While I would encourage you to attend that meeting, please be assured that your email will be shared with the committee members as they deliberate and vote on this issue. Please note that the September 28 meeting will result in a recommendation(s) to the entire City Council which will be discussed at and voted on at one of our council meetings in October.

Again, my thanks to you for your comments; stay safe and best wishes.

Joseph A. Marchese

Mayor, City of Darien
630-353-8108
Celebrating "50" Years!

To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!

http://www.darien.il.us/Reference-Desk/DirectConnect.aspx

From: WOSTRATZKY Millie <mwostratzky@[redacted]
Sent: Tuesday, September 8, 2020 1:47 PM
To: Joe Marchese <jmarchese@darienil.gov>; Ted schauer <tschauer@darienil.gov>; Joseph Kenny <jkenny@darienil.gov>; Lester Vaughan <lVaughan@darienil.gov>; Thomas Chlystek <TChlystek@darienil.gov>; Mary Sullivan <MSullivan@darienil.gov>; Eric Gustafson <egustafson@darienil.gov>; Tom Belczak <tbelczak@darienil.gov>; Dan Gombac <dgombac@darienil.gov>
Subject: Chickens???????

To all concerned Darien Government Officials,

I have recently heard about the issue of residents having live chickens in a densely populated community. To me, this is outrageous. These residents aren't even the home's owners, but renters who probably aren't particularly interested, or care, how this affects property value. These residents have chickens, an enlarged coop (no permit) with no fence so that chickens can meander on to neighbor's lawns. Would you want this next to your home?? I know I absolutely wouldn't. I think that since Darien's motto is a "Nice Place to Live", this doesn't cover growing farm animals. I implore you to establish an ordinance to ban growing chickens in our community. It is unfair to subject established homeowners to the annoyance that comes with living next to chickens. Again, how would you feel if this was occurring right next door to your home? Please settle this issue accordingly.

Sincerely,
Millie Wostratzky-32 year Darien resident

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Chickens???????
Date: Wednesday, September 9, 2020 8:05:24 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: WOSTRATZKY Millie <mwostratzky@[redacted]
Date: 9/8/20 4:27 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: RE: Chickens???????

Thank you!

> On 09/08/2020 3:08 PM Joseph Kenny < jkenny@darienil.gov> wrote:
>
> Millie,
>
> I have received your email as well as a handful of other Darien residents. I will use all of the feedback provided to make an informed decision when it's time for the City Council to vote on an ordinance.
>
> Sincerely,
>
> Joe Kenny
> Darien Alderman Ward 3
> 1605 Holly Ave
> Darien, IL 60561
> (630)334-2858.
>
> Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: WOSTRATZKY Millie < mwostratzky@[redacted] >
Date: 9/8/20 1:49 PM (GMT-06:00)
To: Joe Marchese < jmarchese@darienil.gov>, Ted schauer < tschauer@darienil.gov>, Joseph Kenny < jkenny@darienil.gov>, Lester Vaughan < lVaughan@darienil.gov>, Thomas Chlystek < TChlystek@darienil.gov>, Mary Sullivan < MSullivan@darienil.gov>, Eric Gustafson < egustafson@darienil.gov>, Tom Belczak < tbelczak@darienil.gov>, Dan Gombac < dgombac@darienil.gov>
Subject: Chickens???????

To all concerned Darien Government Officials,

I have recently heard about the issue of residents having live chickens in a densely populated community. To me, this is outrageous. These residents aren't even the home's owners, but renters who probably aren't particularly interested, or care, how this affects property value. These residents have chickens, an enlarged coop (no permit) with no fence so that chickens can meander on to neighbor's lawns. Would you want this next to your home?? I know I absolutely wouldn't. I think that since Darien's motto is a "Nice Place to Live", this doesn't cover growing farm animals. I implore you to establish an ordinance to ban growing chickens in our community. It is unfair to subject established homeowners to the annoyance that comes with living next to chickens. Again, how would you feel if this was occurring right next door to your home? Please settle this issue accordingly.

Sincerely,
Millie Wostratzky-32 year Darien resident

From: Dan Gombac
To: Regina Kokkinis
Subject: FW: Ordinance
Date: Thursday, September 10, 2020 9:41:39 AM

Maybe a duplicate from earlier.

Daniel Gombac
Director of Municipal Services
630-353-8106

To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: Joseph Kenny <jkenny@darienil.gov>
Sent: Wednesday, September 9, 2020 8:13 PM
To: Dan Gombac <dgombac@darienil.gov>; Diane Noverini <dnoverini@darienil.gov>
Subject: FW: Ordinance

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Nancy Brogato <brogato@[redacted]>
Date: 8/31/20 4:26 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Ordinance

I love in Norman courts and we are Against raising chickens and bees!!!!

Sent from my iPhone

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Vote NO on new ordinances
Date: Wednesday, September 9, 2020 8:04:52 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Carol Norbut <c.norbut@[redacted]>
Date: 9/8/20 4:25 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Vote NO on new ordinances

This is to encourage you to vote no on the ordinance allowing chickens to be raised in Darien as well as the one allowing bees to be kept on Darien property. I am against both proposals and urge you to vote no. Thanking you in advance,

Carol Norbut

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Bees and chickens
Date: Wednesday, September 9, 2020 8:07:00 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: lawrence jostock <wernoz@[redacted]>
Date: 9/2/20 7:35 AM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Bees and chickens

Dear Mr. Kenny,

In our opinion, we do not favor keeping bees and chickens in Darien.

Thank you,

Gloria Clancy & Lawrence Jostock
1431 Coventry Ct.
Darien, IL 60561

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Chickens and Bee Hives upcomming Vote
Date: Wednesday, September 9, 2020 8:07:30 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: JOSEPH VALO <jvalo@[redacted]>
Date: 9/1/20 4:55 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Chickens and Bee Hives upcomming Vote

I am asking that you vote NO in regard to allowing Chickens and Bees to be raised in the city of Darien. This is definitely not a rural community.

Joseph Valo
Resident and Home Owner of Darien.

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Chickens and bee hives
Date: Wednesday, September 9, 2020 8:08:54 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: MARTIN GABRIEL <mgabriel1521@[redacted]>
Date: 9/1/20 10:47 AM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Chickens and bee hives

I am a resident of Darien, Il. and I emphatically do not want chickens or bee hives to be allowed in Darien.

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: New vote
Date: Wednesday, September 9, 2020 8:09:49 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: "James C. Williams" <jamescwilliams@[redacted]>
Date: 9/1/20 9:33 AM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Re: New vote

So noted. Thanks.

> On Aug 31, 2020, at 7:16 PM, Joseph Kenny <jkenny@darienil.gov> wrote:
>
> Jim,
>
> I have received your email as well as a handful of your neighbors. I will use all of the feedback provided to make an informed decision when it's time for the City Council to vote on an ordinance.
>
> Sincerely,
>
> Joe Kenny
> Darien Alderman Ward 3
> 1605 Holly Ave
> Darien, IL 60561
> (630)334-2858.
>
> Sent from my Sprint Samsung Galaxy Note9.
>
> -------- Original message --------

From: "James C. Williams" <jamescwilliams@[redacted]>
Date: 8/31/20 1:28 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Fwd: New vote

Alderman Kenny:

I also believe Darien is not the proper place for either chickens or bee keeping. They are not consistent with Darien's general environment. I also believe their existence would have a negative impact on property values.

Best Regards,
Jim Williams
1450 Coventry Court

Begin forwarded message:

From: Carolyn Williams
<carolynswilliams@[redacted]<mailto:carolynswilliams@[redacted]>>
Subject: Fwd: New vote
Date: August 31, 2020 at 12:51:07 PM CDT
To: Jim Williams
<jamescwilliams@[redacted]<mailto:jamescwilliams[redacted]>>
Cc: Bonnie Kucera
<bonniekucera@[redacted]<mailto:bonniekucera@[redacted]>>

Begin forwarded message:

From: Carolyn Williams
<carolynswilliams@[redacted]<mailto:carolynswilliams@[redacted]>
Subject: New vote
Date: August 31, 2020 at 12:49:47 PM CDT
To: jkenny@darienil.gov<mailto:jkenny@darienil.gov>

Alderman Kenny

Although I appreciate the enjoyment of chickens and bee keeping by various people and don't find either animal/insect undesirable, I do NOT believe Darien is an appropriate suburb for either one of these. Properties and family homes are comfortably close and allowing chickens and bees in such small areas would not be in keeping with the harmony Darien has as a community.

Regards
Carolyn Williams
1450 Coventry Ct.

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Chickens and Bees.
Date: Wednesday, September 9, 2020 8:10:14 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: jjesamspop@[redacted]
Date: 9/1/20 8:59 AM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Re: Chickens and Bees.

Thank you.

Sally

-----Original Message-----
From: Joseph Kenny <jkenny@darienil.gov>
To: jjesamspop@[redacted] <jjesamspop@[redacted]
Sent: Mon, Aug 31, 2020 7:15 pm
Subject: RE: Chickens and Bees.

Sally,

I have received your email as well as a handful of your neighbors. I will use all of the feedback provided to make an informed decision when it's time for the City Council to vote on an ordinance.

Sincerely,

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: jjesamspop[redacted]
Date: 8/31/20 1:53 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Chickens and Bees.

Dear Alderman Kenny,

I currently live in a town home. While I can see where it may be possible to allow chickens and bees to be raised in a single family home and yard, I am against allowing it in a community living situation such as a town home association where the occupants are in much closer proximity to see other and yard space is scarce.

When and if an ordinance is written, please consider my concerns.

Thank you.

Sally English
1500 Canterbury Court
Darien, IL 60561

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Chickens
Date: Wednesday, September 9, 2020 8:12:14 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Mark Costa <mckc123@[redacted]>
Date: 8/31/20 8:17 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Chickens

Hi Alderman Kenny,

Hope this finds you and yours well. Thank you for your representation of our ward and your service to the community.

I'm writing to you asking that City Council not create a residential chicken ordinance. I respect the educational value, the food source (eggs) and whatever other reasons proponents advocate for. My biggest objection is to the health risk to the community through bacterial introductions And other communicable transmissions in today's world present or that may lie ahead. I think we've all had enough of that.

I hope we can curtail this movement and not let it be our "Sterogenics"

I trust you understand my position.

Sincerely,

Mark Costa
1438 Coventry Ct

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW:
Date: Wednesday, September 9, 2020 8:12:47 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Vivian <vhynes123[redacted]>
Date: 8/31/20 7:24 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject:

Sent from my iPhone. I understand a vote will be taken Monday night regarding the raising of chickens and bees by Darien residents. As a townhome owner these critters would have to be housed closer to my home than would be with a single family home. Please vote no. Thank you. Tom Hynes, 1501 Canterbury

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Vote re: Chickens being allowed in Darien
Date: Wednesday, September 9, 2020 8:14:11 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: RENEE FIDANZO <renee_fidanzo@[redacted]>
Date: 8/31/20 1:35 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Vote re: Chickens being allowed in Darien

Hi,

I have never sent an email on anything like this but feel very strongly. I work behind the scenes being a Social Worker/Forensic Interviewer working with children that have been abused. I have lived in Darien over 18 years and right next door in Downers Grove another 20 years prior. I love the city of Darien and do what I can to always keep my area at the highest level as I feel it reflects myself and my neighbors.

I ask that you consider not voting for the approval of chickens in residence in Darien. I think there is a place for everything and our homes in Darien is not the place. Once you start to lower the bar you open yourself up to many other things that would bring our home values down.

I did not want to take up much of your time. If you have any questions please let me know.

thank you for all that you do. Please stay safe.

Renee M. Fidanzo, LCSW, CWEL

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Chickens and bees
Date: Wednesday, September 9, 2020 8:14:33 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Jim Craig <pastorjimglcc@[redacted]>
Date: 8/31/20 1:02 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Chickens and bees

Vote no on allowing both chickens and bee hives to be kept in Darien unless the homeowner has a very sizable piece of property. There should be an ordinance specifying the exact measurement of square feet required in order to have either.

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: chicken and bee keeping
Date: Wednesday, September 9, 2020 8:15:56 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: "Toljanic, Joseph" <jtolja@[redacted]>
Date: 8/31/20 12:08 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: chicken and bee keeping

Hello Mr. Kenny,
As a long time resident of Darien, I wanted to express my opinion regarding keeping bees and chickens in our city. I disagree with approval of this ordinance. We live in a suburban environment and not a rural environment. Beekeeping and chickens would detract from that suburban feel. I would also be concerned about the additional bees in the neighborhood that may sting my family. I am especially concerned about the chickens that I feel would create the potential for an unhealthy environment. I just yesterday heard a rooster crowing in the morning very close to where I live which took me by complete surprise. I do not appreciate being awakened by this noise. I am very concerned that if approved, this ordinance may lead to people choosing not to live in Darien which could decrease the value of my property. Please vote against this ordinance when it come up for a vote
Thanks you in advance for your consideration,
Dr. Joseph Toljanic
1527 Brittany Ct
Darien
Sent from Mail for Windows 10

From: Joseph Kenny
To: Dan Gombac; Diane Noverini
Subject: FW: Voting for Chickens!
Date: Wednesday, September 9, 2020 8:16:22 PM

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Bonnie Kucera <bonniekucera@[redacted]>
Date: 8/31/20 11:19 AM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Voting for Chickens!

Hi Joe,
I am not sure what to call this - so, I am not in favor of the City allowing Chickens or Bees to be breed, living or cared for on residential properties. The chickens will not provide any type of value to the our personal or city property. Perhaps even provide a health concern especially airborne. There are several type of farmer communes in the area (way further west) that those that wish to raise or have contact with chickens can visit or buy into. Not sure if you are voting on Bees yet but so many people are allergic I think it becomes a health concern. I am not sure of your position on this but giving you mine!

Take care. Hope you are Lisa are enjoying this beautiful much cooler weather!

Bonnie Kucera 1427 Coventry Court Darien, IL 60561 [redacted]
bonniekucera@[redacted]

From:	Mary Belmonte
To:	Regina Kokkinis
Subject:	FW: Contact Us
Date:	Friday, September 11, 2020 9:21:15 AM

From: postmaster@muniweb.com <postmaster@muniweb.com>
Sent: Thursday, September 10, 2020 5:18 PM
To: Mary Belmonte <mbelmonte@darienil.gov>
Subject: Contact Us

ContactID: 87

Form inserted: 9/10/2020 6:17:21 PM

Form updated: 9/10/2020 6:17:21 PM

First name: Gale

Last name: Dyskie

Email: Gale@[redacted]

Message: Hello I just wanted to give myt input regarding chickens. I see nothing wrong with having chickens and there are many homes in Downers Grove which have them as well. I do not see any issues with this and hope that you will make Darien chicken friendly

ConfirmUserPolicy: I confirm that I have read and understood the privacy policy statement.

Enter security code:[redacted]

From: Dan Gombac
To: Regina Kokkinis
Cc: Tom Belczak; Bryon Vana
Subject: FW: chicken thoughts
Date: Thursday, September 17, 2020 10:07:23 AM

Pls add to the matrix and b/u.

Daniel Gombac
Director of Municipal Services
630-353-8106
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: Bryon Vana <bvana@darienil.gov>
Sent: Wednesday, September 16, 2020 4:37 PM
To: Forward ForT Belzczak <tjbelczak@[redacted]>
Cc: Dan Gombac <dgombac@darienil.gov>
Subject: RE: chicken thoughts

Dan

I think all of the communications you receive will be put into the packet and sent out at one time so they are all in one place. Is that correct?

Bryon D. Vana
Bryon D. Vana
City Administrator -City of Darien, Office phone – 630-353-8114
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT -Follow the link and subscribing is simple!
http://www.darien.il.us/Reference-Desk/DirectConnect.aspx

From: Thomas Belczak <tjbelczak@[redacted]>
Sent: Wednesday, September 16, 2020 4:11 PM
To: Bryon Vana <bvana@darienil.gov>
Cc: Dan Gombac <dgombac@darienil.gov>
Subject: Fwd: chicken thoughts

I received the following email; Feel free to share with other elected officials.

Begin forwarded message:

From: <bill.christenson@[redacted]>
Subject: chicken thoughts
Date: September 15, 2020 at 8:09:44 PM CDT
To: <tjbelczak@[redacted]>

We were asked to contact you with our position on the chicken issue so that you have input from your constituents. First and foremost though, we are concerned that there seems to be a decline in polite neighborly communication as a whole. Or even polite neighborly consideration. We would want our neighbors to communicate to find a solution that is considerate of all involved – it would have solved so much in this instance.

That being said – we are for chickens, but privately!
I tried to research it and found:
An average chicken lays 5-6 eggs. For a family of four - 30-36 eggs a week seems like a lot of eggs - 6 chickens sounds like a starting point.
On average a chicken needs approx. 6sf/chicken for the coop and 10sf/chicken for the run. Again, 6 chickens seems like it would not be taking up too much space – (1) 6x6 = a 36 sf coop with a run that is approx. 6x10 = so a total of approx. 100sf
The problem seems as to be where it is located and who sees it…. To be honest, the closer to their own house seems fair and a privacy fence seems like it would quell any complaints.
Layer Hens do not make much noise and if the chickens are given fresh ground (4-5 x's a week) there should not be a smell.

6 chickens per property that is of average size, less chickens for the odd small property.
A 20 foot or so minimum for the entire structure from any property line fair? Does there need to be an understanding for movable coop structures?
A hard privacy fence on any side facing another property or common thoroughfare.
Landscaping is not a permanent solution for year round privacy . I also do not foresee owners buying plants that are full grown and providing privacy from day one.
Is a limit of One coop and one run per property reasonable? – ONE structure – owners should think ahead and get a permit just as is required for a shed.
Licensing would give the city some control and compensation for dealing with complaints.
A Minimum # of licenses - to be renewed each year would keep it from getting out of hand, and provide for consequences if neighbor's complaints are verified by city.

This is a fad – sooner or later, as little children grow and get involved, life's busy schedule will catch up with the least hardy of the chicken farmers and that will be that.
Chickens are work, plain and simple. If I were going to do it.. I'd move out to the country where I could do it well.
I hope we weren't too late. Best of luck on deciding the future or rural Darien!
Anne and Bill

From: Dan Gombac
To: Lee Pahr; Regina Kokkinis
Cc: Eric Gustafson; Joe Marchese
Subject: RE: Chickens
Date: Thursday, September 17, 2020 10:34:09 AM

Thanks Lee

Daniel Gombac
Director of Municipal Services
630-353-8106
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

-----Original Message-----
From: Lee Pahr <leepahr@[redacted]>
Sent: Thursday, September 17, 2020 10:22 AM
To: Joe Marchese <jmarchese@darienil.gov>
Cc: Eric Gustafson <egustafson@darienil.gov>; Dan Gombac <dgombac@darienil.gov>
Subject: Chickens

I am a Darien resident for the past 28 years.

I had spent 75 days this past spring & summer on an organic farm in rural Pierre, SD. While the farm had range fed chickens, it was my understanding that the "city" of Pierre does not allow chickens to be raised/kept within their city limits.

I went and sat in Darien Pool's parking lot and viewed what your current "chicken" debate was, 1st hand. I can't imagine if the pool was open this past summer, what potential for, perhaps tragic, incident(s) could have occurred in such a public/urban setting. Have you personally viewed the unappealing curb aesthetic. Aren't you concerned how chickens can bring in additional predators and vermin to an area?

As a Darien resident, I would appreciate your debate in this issue to address ALL farm animals within Darien's city limits, place minimum acreage verbage as well as "free range" not be permitted within the city limits of Darien.

Thank you for your time and consideration.

Leonette Pahr
7828 Dorchester Lane
Darien, IL 60561

From:	Kristina Nemetz
To:	Dan Gombac; Regina Kokkinis
Cc:	Joseph Hennerfeind; Bryon Vana; Tom Belczak; Joe Marchese; mariepche[redacted]
Subject:	Ordinance with Resident Notes in preparation for September 28 sub-committee
Date:	Thursday, September 17, 2020 2:49:09 PM
Attachments:	image011.png image012.png image013.png image014.png image016.png image004.png Attachment B - Chickens and Bees JH edits DG edits RK 09-02-20 w EDITS from RESIDENTS 9.6.20 (1).docx

Hi Dan,

Marie Freidag (my mother) asked me to forward the ordinance to you with our notes and suggestions for the Mayor, Commissioner, and staff consideration. She is unable to reach her computer right now. Please confirm upon receipt that the right column with notes and suggestions is visible. We spent a great deal of time consulting web references as well as colleagues, other Village council people, veterinarians, and county officials in an effort to provide factual information on the potential implications of this ordinance and how this can be amended to protect both sides of the "yet to be required" fence.

Following the meeting in August I was under the impression there would be an actual mediation that would take place in regards to this matter prior to the next meeting. It is disappointing to watch Melissa Goodridge continue to expand her coop and plant ornamentals in accordance with this proposed ordinance. An ordinance she must think is somewhat final according to her interaction with my father, and an ordinance she clearly knew about well in advance of my parents receiving a copy to review. Not quite sure how this process is going, but from a fellow municipal employee's perspective it looks fairly "pro-chicken" driven. It seems pretty obvious there may be someone advising her of the proposal and encouraging them to expand to meet these current conditions to have an advantage. I hope you will find the attached notes, comments, and insight helpful in finding an equitable and fair ordinance for all residents of Darien.

There are reasons a majority of the Western Suburbs have banned or put severe restrictions on chickens. There is too much risk for the community as a whole and not enough individual reward. Why risk the health and safety of all, for the loudest chicken in the coop? It is a difficult balance to find. I don't envy the heavy lifting and time I am sure you all have put in to this issue.

You will find many of these concerns addressed in the attached. I am happy to provide input additional sources that are required. I obviously have a vested interest in protecting my parents and their home, but also am happy to provide support to fellow municipalities as fellow civil servant.

Thank you for your time.

Kristina

[redacted]

From: Dan Gombac [mailto:dgombac@darienil.gov]
Sent: Tuesday, August 18, 2020 2:38 PM
To: Kristina Nemetz <knemetz[redacted]>; Regina Kokkinis <rkokkinis@darienil.gov>
Cc: Joseph Hennerfeind <jhennerfeind@darienil.gov>; Bryon Vana <bvana@darienil.gov>; Tom Belczak <tbelczak@darienil.gov>; Joe Marchese <jmarchese@darienil.gov>
Subject: RE: Concern | Chicken Coop on Seminole & Ironwood

Good afternoon Kristina,

Thank you for your e-mail and we will keep you posted regarding the upcoming discussions.

Regina,

Please add this e-mail as backup.

Daniel Gombac
Director of Municipal Services
630-353-8106
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

From: Kristina Nemetz <knemetz@[redacted]>
Sent: Tuesday, August 18, 2020 2:25 PM
To: Dan Gombac <dgombac@darienil.gov>
Subject: Concern | Chicken Coop on Seminole & Ironwood

Hi Dan,

I hope this emails finds you well. As you can tell from my work signature below, I am all too aware of what municipal government looks like during a pandemic and especially in regards to resident concerns.

I grew up at 1009 Ironwood Ave. I lived in Darien from 1982-2002, 2005-2007, and again in 2017 (while we refinished our home). My parents are Jim & Marie Freidag. I understand this chicken thing is causing quite a stir. My email today is to not only express my sincere concern for this ordinance to be put in place, but for it **to be developed to protect the adjacent neighbors of both this chicken coop and others within the City limits**. A privacy fence **needs** to be a part of this ordinance and all current chicken owners should have to comply, nothing should be grandfathered in. This fencing should be at the expense of the chicken owners not the neighboring properties attempting to protect the value of their homes.

When the chicken coop was going up, I had my reservations, but my parents are truly good people and amazing neighbors and did their best to be supportive. They even attempted to mediate several times between other neighbors who were bothered by this. They have taken to playing with the kids next door (Melissa's), hanging out with them with the mom goes MIA (lots of on record mental issues), invites them over for bonfires, they even helped Melissa and Jim try a new business and they FUNDED their start-up kit. They still to this day snow plow the entire corner of Seminole and Ironwood, even in their mid-60s, because they are just GOOD PEOPLE. Did you even hear my dad last night offer to build the fence himself at his expense if the City would authorize him to? Unfortunately in the aftermath of last night, Melissa Goodrich has taken to social media to shame my parents publicly which is total uncalled for and is completely out of line. You mentioned Mediation at the meeting last night. I wanted to thank you in advance for taking this into consideration as at this point I am thinking it is going to be necessary. I am grateful for City staff such as yourself who is willing to help stop situations from getting worse.

You have a *renter* ridiculing and publically name calling, a longtime resident, senior couple. It is shameful and puts Darien in a negative spotlight. I am honestly concerned for my parents well-being. She is not mentally stable. Her social media posts are irrational, her recalling of events is false, her argument lacks any sound understanding of civilian rights. In one post she cited this not being about the chickens, but about her "right as a millennial". Many days the woman does not come out of her house and her parents never leave her alone in the house unless her kids are gone. She has been diagnosed bi-polar, police records probably will confirm this dating back several years even prior to her living on Seminole Drive on the other side of Darien. The yard is rarely ever kept clean. Honestly since she called the Darien Patch to come out for the story, the yard looks the nicest it has ever looked. Apparently it is "show time", now that the media is involved.

Unfortunately for my parents, the media will stop covering this at some point and the yard without the restrictions of a privacy fence will go back status quo. I hate the thought that someone else's actions will devalue the hard work and investment my parents have made into their house that they have called home since 1982. Let alone this could happen elsewhere in town to another family or someone who isn't willing to speak up. When Melissa stated last night having chickens in the neighborhood would "attract younger residents" she is FAR from the truth. If you drove up to a home to look at it and your future neighbor's yard looked like the property that Melissa Goodrich lives at PLUS it had a chicken coop, would you even go in the house for a tour? I am technically in that "millennial" age she is speaking of and I most definitely would not even get out of my car no matter how great a house might look on paper.

Dan, I know your job is not easy. I know the chickens are probably causing headaches that were not required in a time like this. I thank you in advance for your service to Darien and for your attention to resident concerns. I have worked with a lot of boards and councils in career and it was nice to know that Darien seemed to have many even-keeled individuals working and representing the City.

Thank you for your time and consideration. Please reach out with any questions.

Kristina Nemetz

expanded comments at the end of document

TITLE 7: HEALTH AND SANITATION

Chapter 5: ANIMALS

7-5-1 Chickens

1. DEFINITIONS;

   CHICKEN(S): the common domestic fowl (Gallus gallus domesticus) especially when young.

   COOP: Shall mean and include a coop, building, pen or other enclosure, with or without an enclosed pen or hen yard that is designed, constructed and maintained to confine fowl within the coop and to prevent access by predators and trespassers.

   FOWL: Any domesticated egg laying chicken hen and shall exclude all roosters and chicken hens that have ceased laying eggs.

   HEN: a female chicken.

   POULTRY: domestic fowl, such as chickens, turkeys, ducks, and geese.

   ROOSTER: a male chicken.

2. REQUIREMENTS; PEMITS, FEES & PENALTIES

   a. The raising/keeping of hens shall be permitted on all single-family detached single family residential zoning lots containing a minimum of six thousand (6,000) square feet as an accessory use.
   b. A maximum of eight (8) hens shall be permitted.
   c. All hens shall be kept within a coop consisting of a covered enclosure/structure with an attached covered/enclosed outdoor area to prevent hens from encroaching onto neighboring properties.
   d. An outdoor area a minimum of ten (10) square feet per hen will be required and a maximum of two hundred (200) total square feet will be permitted for both the covered enclosure / structure and outdoor area. The total height of a coop may not exceed seven (7) feet.
   e. All enclosures/structures shall be located a minimum of ten feet (10') from all lot lines.
   f. All hens and enclosures/structures shall be kept/located in the rear yard only.
   g. All areas where hens are kept shall be clean and well maintained on a daily basis, with little to no accumulation of waste. In addition, all areas where hens are kept shall not produce or cause odors that are detectable on adjacent properties.
   h. All chicken coops shall require an approved 6-foot screening barrier, located on 3 (three) sides of the coop, within 5 feet from the coop and consisting of a solid privacy fence ~~or~~ AND 6-foot high arborvitae spaced in zig-zag pattern as not to

Commented [KN1]: This 6,000 square feet is 0.138 acres. Many other towns required a minimum of 1 acre lot.

Commented [KN2]: This should be a maximum of 4 hens to align with all other local municipalities. Since you are not allowing eggs to be "sold" there is realistically no reason for a family raising chickens for a food source to have/need more than 4. Average hen lays 265 eggs per year at 4 hens that is 1,060 eggs a year and on average 20 eggs per week. That is almost 2 dozen.

Commented [KN3]: The math doesn't work out. If you get 8 hens and they need 10 square feet there is no need for a 10'x20' space. Let alone the need for it to be 7 ft. high. Seems like this was built to allow for the coops that already exist in Darien vs. what is appropriate for the raising chickens. This does not protect the neighbors adjacent, especially when this is allowed on 0.1386 acre space.

Proposed 15 square feet per chicken (this allows double the suggested indoor space + 10 ft run) so a max of 120 square feet Coop.

Also, if fence height is limited to 6 ft. The coop should also be limited to 6 ft to ensure the minimizing of visibility to neighbors.

A simiple Google search found all websites supported these space requirements. On the website, backyardchicker ... [1]

Commented [KN4]: The adjacent neighbors deserve a larger distance than this. According to the IDPH (idph.state.il.us) "Salmonella and Campylobactor are common public health hazards potentially associated with chicken contact. These bacteria carried by HEALTHY chickens and are communicable to people through direct contact and exposure to manure." Poultry usually do not show signs of Salmonella infection (according to the C ... [2]

Commented [KN5]: This is difficult to quantify and does not dictate how this will be determined to protect the adjacent neighbors. Odors can be detectable at certain times based on wind direction and location of where individual that "detects smell" is at.

Hens and pens produced odors, they are livestock, if this is what Darien is saying to protect the adjacent neighbor ... [3]

Commented [KN6]: This should be more specific than "no accumulation of waste" and should include specific instruction on the required/proper way to dispose of waste from chickens. This includes bedding, manure, feathers, and rotten eggs all which carry diseases that can be communicable to humans.

Commented [KN7]: A privacy screen alone does not ensure limits of visibility from the street and does not protect the neighbors with any physical barrier if it is only on 3 sides. The City should require perimeter privacy fence AND require some additional screening near the coop to provide additional protection and screening for both the neighbors and inhabitants of the property itself

expanded comments at the end of document

allow any portion of the coop to be seen. As an alternative, perimeter fencing around the entire yard – six (6) foot high fence shall satisfy the screening requirement.

i. Humane conditions are to be maintained year round.
j. Roosters are prohibited.
k. Slaughtering is prohibited.
l. No other poultry, including but not limited to geese, ducks and turkeys shall be kept on the property.
m. An initial hen permit shall be required for approval of hens, coops, and required fencing or screening. Permit application shall be authorized by owner of property. Permit authorizes City staff to inspect property for compliance when deemed necessary. Permit approval is required prior to obtaining hens.
n. A hen permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.
o. A hen permit issued under this article shall be revoked upon the commission of three (3) violations within a period of twelve (12) months.
p. Sales of egg(s) or hen(s) or anything related to chicken keeping are not allowed.
q. On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the keeping of hens regulations of this article. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

Commented [KN8]: It should be noted that hens produce eggs at approximately 5 months of age and their ability to lay eggs ends at about 2 years of age. Therefore every 2 years chickens will need to be disposed of if the purpose of this ordinance is for the raising of chicken's as a food source. The life of a chicken is approximately 10 years.

Commented [KN9]: Darien limits dogs and cats to a limit of 3 max per house. Should those with chickens be required to limit other animals additionally to maintain humane standards and protect any minors/ children living in the home?

Commented [KN10]: This ordinance will be enforced at a loss to Darien at this rate/fee structure. At minimum this should be an annual fee permit holder is required to pay. There should be a one-time fee per hen good for its lifecycle. Therefore, when owners purchase new hens they would be required to reregister with the City of Darien.

Commented [KN11]: Items for consideration that are missing from this proposed ordinance:

- veterinary check-ups of livestock
- liability insurance
- approval from neighboring properties
- requirement that coop construction plans be submitted in advance to the City of Darien for approval
- specifications and timeline for inspections (require at minimum one annual inspection)
- In the State of Illinois, the weather during the winter does not allow for chickens to live outside without a heat source. There should be some restrictions for where livestock should be stored safely in the Winter as to not limit owners from bringing chicken indoors and exposing minors/children to the diseases carried by chickens.
- specific wording and information supporting that chickens are not pets so therefore are subject to the terms of this ordinance and not those of pets (should not be allowed in homes or allowed to wander in yard)
- Some consideration should be given to the distance some residences are to DuPage County Health Department permitted food service locations (i.e. Darien Swim & Racket Club)
- Consideration is needed to elevation of the property and the natural pattern of run off which will allow manure seepage into other yards (specifically as it relates to property at 1009 Ironwood Ave.)

7-5-2 Hobby Beekeeping

1. DEFINITIONS;

APIARY: A place where one or more bee colonies are kept.

BEE: Any stage of the common domestic honey bee, Apis mellifera species.

BEEKEEPER: A person who owns or has charge of one or more colonies of bees.

BEEKEEPING EQUIPMENT: Anything used in the operation of an apiary, including, but not limited to, hive bodies, supers, frames, top and bottom boards and extractors.

COLONY (COLONIES): A hive and its equipment and appurtenances, including bees, comb, honey, pollen and brood.

FLYAWAY BARRIER: Barrier that raises the flight path of bees as they come and go from a hive.

HIVE: A structure intended for the housing of a bee colony.

HOBBY BEEKEEPING: The keeping of bees subject to the restrictions set forth in this chapter.

NUCLEUS COLONY: A small quantity of bees with a queen housed in a smaller than usual hive box designed for a particular purpose.

2. REQUIREMENTS; PEMITS, FEES & PENALTIES

a. Bees and bee hives shall be permitted on residential zoning lots containing a minimum of ten thousand (10,000) square feet as an accessory use.
b. A maximum of two (2) hives/colonies shall be permitted on properties zoned and occupied for single family residential uses.
c. The hive(s) shall be located only in the rear yard and a minimum of fifteen feet (15') from all lot lines.
d. A flyway barrier at least five feet (5') in height, consisting of a solid fence, tall bushes, the side of your garage or shed, or anything else that forces the bees to immediately fly up into the air and away from people adjacent to the beekeeping hives.
e. Prominent signage warning of the presence of bees shall be required on the property (i.e., gate).
f. Each hive shall not exceed five feet (5') in height, nor shall the land area designated for the hives exceed thirty (30) square feet in total.
g. A source of water shall be available at all times on the property during the beehive's active months (March - November). Humane conditions are to be maintained year round.
h. All areas where beehives are kept shall be clean and well maintained with no accumulation of bee combs, wax, etc., around the site.
i. An initial building-registration permit shall be required for all hives and an inspection/approval is required prior to obtaining a beekeeping permit.
j. A beekeeping permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.
k. All hives are required to register and maintain requirements with the Illinois Department of Agriculture as required.
l. Sales of honey or anything related to beekeeping are not allowed.
m. On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the hobby beekeeping regulations of this article. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

Page 1: [1] Commented [KN3] **Kristina Nemetz** **9/6/2020 10:51:00 AM**

The math doesn't work out. If you get 8 hens and they need 10 square feet there is no need for a 10'x20' space. Let alone the need for it to be 7 ft. high. Seems like this was built to allow for the coops that already exist in Darien vs. what is appropriate for the raising chickens. This does not protect the neighbors adjacent, especially when this is allowed on 0.1386 acre space.

Proposed 15 square feet per chicken (this allows double the suggested indoor space + 10 ft run) so a max of 120 square feet Coop.

Also, if fence height is limited to 6 ft. The coop should also be limited to 6 ft to ensure the minimizing of visibility to neighbors.

A simiple Google search found all websites supported these space requirements. On the website, backyardchickens.com it states "you should need 100 square feet of space to raise up to 25 chickens".

Page 1: [2] Commented [KN4] **Kristina Nemetz** **9/6/2020 10:57:00 AM**

The adjacent neighbors deserve a larger distance than this. According to the IDPH (idph.state.il.us) "Salmonella and Campylobactor are common public health hazards potentially associated with chicken contact. These bacteria carried by HEALTHY chickens and are communicable to people through direct contact and exposure to manure." Poultry usually do not show signs of Salmonella infection (according to the CDC). Even if they look healthy and clean, poultry CAN still SPREAD the bacteria to people.

Proposed change = Minimum of 20 ft from the lot line, no less than 50 ft. from any neighboring patio, deck, driveway, playset, porch, or leisure area where neighbors (including children) could be at higher risk of exposure.

Page 1: [3] Commented [KN5] **Kristina Nemetz** **9/6/2020 11:22:00 AM**

This is difficult to quantify and does not dictate how this will be determined to protect the adjacent neighbors. Odors can be detectable at certain times based on wind direction and location of where individual that "detects smell" is at.

Hens and pens produced odors, they are livestock, if this is what Darien is saying to protect the adjacent neighbors then Chickens should be banned entirely or should be allowed only on property that keeps chickens a minimum of 150 feet from residences. This is the distance that would safely protect the smell from others. Some websites about raising chickens state that on days of "coop cleaning" the smell can be observed more than 800 ft away from the coop. backyardpoultry.iamcountryside.com.

Main document changes and comments

Page 1: Commented [KN1] **Kristina Nemetz** **9/6/2020 10:47:00 AM**

This 6,000 square feet is 0.138 acres. Many other towns required a minimum of 1 acre lot.

Page 1: Commented [KN2] **Kristina Nemetz** **9/6/2020 10:49:00 AM**

This should be a maximum of 4 hens to align with all other local municipalities. Since you are not allowing eggs to be "sold" there is realistically no reason for a family raising chickens for a food source to have/need more than 4. Average hen lays 265 eggs per year at 4 hens that is 1,060 eggs a year and on average 20 eggs per week. That is almost 2 dozen.

Page 1: Commented [KN3] **Kristina Nemetz** **9/6/2020 10:51:00 AM**

The math doesn't work out. If you get 8 hens and they need 10 square feet there is no need for a 10'x20' space. Let alone the need for it to be 7 ft. high. Seems like this was built to allow for the coops that already exist in Darien vs. what is appropriate for the raising chickens. This does not protect the neighbors adjacent, especially when this is allowed on 0.1386 acre space.

Proposed 15 square feet per chicken (this allows double the suggested indoor space + 10 ft run) so a max of 120 square feet Coop.

Also, if fence height is limited to 6 ft. The coop should also be limited to 6 ft to ensure the minimizing of visibility to neighbors.

A simiple Google search found all websites supported these space requirements. On the website, backyardchickens.com it states "you should need 100 square feet of space to raise up to 25 chickens".

Page 1: Commented [KN4] **Kristina Nemetz** **9/6/2020 10:57:00 AM**

The adjacent neighbors deserve a larger distance than this. According to the IDPH (idph.state.il.us) "Salmonella and Campylobactor are common public health hazards potentially associated with chicken contact. These bacteria carried by HEALTHY chickens and are communicable to people through direct contact and exposure to manure." Poultry usually do not show signs of Salmonella infection (according to the CDC). Even if they look healthy and clean, poultry CAN still SPREAD the bacteria to people.

Proposed change = Minimum of 20 ft from the lot line, no less than 50 ft. from any neighboring patio, deck, driveway, playset, porch, or leisure area where neighbors (including children) could be at higher risk of exposure.

Page 1: Commented [KN5] **Kristina Nemetz** **9/6/2020 11:22:00 AM**

This is difficult to quantify and does not dictate how this will be determined to protect the adjacent neighbors. Odors can be detectable at certain times based on wind direction and location of where individual that "detects smell" is at.

Hens and pens produced odors, they are livestock, if this is what Darien is saying to protect the adjacent neighbors then Chickens should be banned entirely or should be allowed only on property that keeps chickens a minimum of 150 feet from residences. This is the distance that would safely protect the smell from others. Some websites about raising chickens state that on days of “coop cleaning” the smell can be observed more than 800 ft away from the coop. backyardpoultry.iamcountryside.com.

Page 1: Commented [KN6] **Kristina Nemetz** **9/6/2020 11:01:00 AM**

This should be more specific than “no accumulation of waste” and should include specific instruction on the required/proper way to dispose of waste from chickens. This includes bedding, manure, feathers, and rotten eggs all which carry diseases that can be communicable to humans.

Page 1: Deleted **Kristina Nemetz** **9/6/2020 11:03:00 AM**

or

a.

Page 1: Inserted **Kristina Nemetz** **9/6/2020 11:03:00 AM**

AND

a.

Page 1: Commented [KN7] **Kristina Nemetz** **9/6/2020 11:03:00 AM**

A privacy screen alone does not ensure limits of visibility from the street and does not protect the neighbors with any physical barrier if it is only on 3 sides. The City should require perimeter privacy fence AND require some additional screening near the coop to provide additional protection and screening for both the neighbors and inhabitants of the property itself

Page 2: Commented [KN8] **Kristina Nemetz** **9/6/2020 11:07:00 AM**

It should be noted that hens produce eggs at approximately 5 months of age and their ability to lay eggs ends at about 2 years of age. Therefore every 2 years chickens will need to be disposed of if the purpose of this ordinance is for the raising of chicken’s as a food source. The life of a chicken is approximately 10 years.

Page 2: Commented [KN9] **Kristina Nemetz** **9/6/2020 11:08:00 AM**

Darien limits dogs and cats to a limit of 3 max per house. Should those with chickens be required to limit other animals additionally to maintain humane standards and protect any minors/ children living in the home?

Page 2: Inserted **Kristina Nemetz** **9/6/2020 11:08:00 AM**

a.

Page 2: Commented [KN10] **Kristina Nemetz** **9/6/2020 11:09:00 AM**

This ordinance will be enforced at a loss to Darien at this rate/fee structure. At minimum this should be an annual fee permit holder is required to pay. There should be a one-time fee per hen good for its lifecycle. Therefore, when owners purchase new hens they would be required to reregister with the City of Darien.

Page 2: Commented [KN11] **Kristina Nemetz** **9/6/2020 11:11:00 AM**

Items for consideration that are missing from this proposed ordinance:

- veterinary check-ups of livestock

- liability insurance

- approval from neighboring properties

- requirement that coop construction plans be submitted in advance to the City of Darien for approval

- specifications and timeline for inspections (require at minimum one annual inspection)

- In the State of Illinois, the weather during the winter does not allow for chickens to live outside without a heat source. There should be some restrictions for where livestock should be stored safely in the Winter as to not limit owners from bringing chicken indoors and exposing minors/children to the diseases carried by chickens.

- specific wording and information supporting that chickens are not pets so therefore are subject to the terms of this ordinance and not those of pets (should not be allowed in homes or allowed to wander in yard)

- Some consideration should be given to the distance some residences are to DuPage County Health Department permitted food service locations (i.e. Darien Swim & Racket Club)

- Consideration is needed to elevation of the property and the natural pattern of run off which will allow manure seepage into other yards (specifically as it relates to property at 1009 Ironwood Ave.)

Header and footer changes

Text Box changes

Header and footer text box changes

Footnote changes

Endnote changes

From: Dan Gombac
To: Regina Kokkinis
Cc: gtag324@[redacted]
Subject: FW: Coop
Date: Monday, September 21, 2020 10:00:02 AM

Regina,

Add to backp.

Daniel Gombac
Director of Municipal Services
630-353-8106
To receive important information from the City of Darien sign up for our electronic newsletter:
DARIEN DIRECT CONNECT
Follow the link and subscribing is simple!
https://darien.il.us/reference-desk/directconnect-enews

-----Original Message-----
From: Thomas Gannon <gtag324@[redacted]>
Sent: Monday, September 21, 2020 9:53 AM
To: Dan Gombac <dgombac@darienil.gov>
Subject: Coop

DAN WE DO NOT NEED CHICKEN IN DARIEN.

Sent from my iPad

From:	Dan Gombac
To:	Regina Kokkinis
Cc:	Joseph Kenny
Subject:	Fwd: Chickens in Darien
Date:	Monday, September 21, 2020 7:51:18 PM

Begin forwarded message:

From: Joseph Kenny <jkenny@darienil.gov>
Date: September 21, 2020 at 7:49:03 PM CDT
To: Dan Gombac <dgombac@darienil.gov>, Diane Noverini <dnoverini@darienil.gov>
Subject: FW: Chickens in Darien

Tonight's communication

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave
Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Joseph Kenny <jkenny@darienil.gov>
Date: 9/10/20 7:59 PM (GMT-06:00)
To: Stephanie Kochan <stephanie_kochan@[redacted]>
Subject: RE: Chickens in Darien

Stephanie,

I have received your email as well as a handful of other Darien residents. I will use all of the feedback provided to make an informed decision when it's time for the City Council to vote on an ordinance.

Sincerely,

Joe Kenny
Darien Alderman Ward 3
1605 Holly Ave

Darien, IL 60561
(630)334-2858.

Sent from my Sprint Samsung Galaxy Note9.

-------- Original message --------
From: Stephanie Kochan <stephanie_kochan@[redacted]>
Date: 9/10/20 7:50 PM (GMT-06:00)
To: Joseph Kenny <jkenny@darienil.gov>
Subject: Fw: Chickens in Darien

Dear Alderman Kenny,
I realized I forgot you in the address box. So forwarding.

----- Forwarded Message -----
From: Stephanie Kochan <stephanie_kochan@[redacted]>
To: jmarchese@darienil.gov <jmarchese@darienil.gov>
Sent: Thursday, September 10, 2020, 07:48:10 PM CDT
Subject: Chickens in Darien

Dear Mayor and Alderman Kenny,
I've lived in ward 3 for 40+ years. I've never considered keeping chickens, but thought I would comment on the ongoing discussion regarding residents choosing to keep chickens.

I think the Downers Grove model where ALL near neighbors have to sign off on them and a maximum population is a good thing. I also think some requirement about how far away the coop must be from neighbors should be a consideration along with some kind of privacy fencing or hedge might be appropriate.

My daughter kept chickens for years, but they had a five acre lot with not a neighbor in sight. They are smelly, they do draw flies and the birds can wander. A harder thing to live with when most of our lots around 0.3 acres. Please consider the neighbors of the chicken coop when you create your response to resident chickens.

Sincerely,
Stephanie Kochan
1534 77th Street
Darien, IL

TITLE 7: HEALTH AND SANITATION

Chapter 5: ANIMALS

7-5-1 Chickens

1. DEFINITIONS;

   CHICKEN(S): the common domestic fowl (Gallus gallus domesticus) especially when young.

   COOP: Shall mean and include a coop, building, pen or other enclosure, with or without an enclosed pen or hen yard that is designed, constructed and maintained to confine fowl within the coop and to prevent access by predators and trespassers.

   FOWL: Any domesticated egg laying chicken hen and shall exclude all roosters and chicken hens that have ceased laying eggs.

   HEN: a female chicken.

   POULTRY: domestic fowl, such as chickens, turkeys, ducks, and geese.

   ROOSTER: a male chicken.

2. REQUIREMENTS; PEMITS, FEES & PENALTIES

   a. The raising/keeping of hens shall be permitted on all single-family detached single family residential zoning lots containing a minimum of six thousand (6,000) square feet as an accessory use.
   b. A maximum of eight (8) hens shall be permitted.
   c. All hens shall be kept within a coop consisting of a covered enclosure/structure with an attached covered/enclosed outdoor area to prevent hens from encroaching onto neighboring properties.
   d. An outdoor area a minimum of ten (10) square feet per hen will be required and a maximum of two hundred (200) total square feet will be permitted for both the covered enclosure / structure and outdoor area. The total height of a coop may not exceed seven (7) feet.
   e. All enclosures/structures shall be located a minimum of ten feet (10') from all lot lines.
   f. All hens and enclosures/structures shall be kept/located in the rear yard only.
   g. All areas where hens are kept shall be clean and well maintained on a daily basis, with little to no accumulation of waste. In addition, all areas where hens are kept shall not produce or cause odors that are detectable on adjacent properties.
   h. All chicken coops shall require an approved 6-foot screening barrier, located on 3 (three) sides of the coop, within 5 feet from the coop and consisting of a solid privacy fence or 6-foot high arborvitae spaced in zig-zag pattern as not to allow

any portion of the coop to be seen. As an alternative, perimeter fencing around the entire yard – six (6) foot high fence shall satisfy the screening requirement.

i. Humane conditions are to be maintained year round.
j. Roosters are prohibited.
k. Slaughtering is prohibited.
l. No other poultry, including but not limited to geese, ducks and turkeys shall be kept on the property.
m. An initial hen permit shall be required for approval of hens, coops, and required fencing or screening. Permit application shall be authorized by owner of property. Permit authorizes City staff to inspect property for compliance when deemed necessary. Permit approval is required prior to obtaining hens.
n. A hen permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.
o. A hen permit issued under this article shall be revoked upon the commission of three (3) violations within a period of twelve (12) months.
p. Sales of egg(s) or hen(s) or anything related to chicken keeping are not allowed.
q. On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the keeping of hens regulations of this article. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

7-5-2 Hobby Beekeeping

1. DEFINITIONS;

APIARY: A place where one or more bee colonies are kept.

BEE: Any stage of the common domestic honey bee, Apis mellifera species.

BEEKEEPER: A person who owns or has charge of one or more colonies of bees.

BEEKEEPING EQUIPMENT: Anything used in the operation of an apiary, including, but not limited to, hive bodies, supers, frames, top and bottom boards and extractors.

COLONY (COLONIES): A hive and its equipment and appurtenances, including bees, comb, honey, pollen and brood.

FLYAWAY BARRIER: Barrier that raises the flight path of bees as they come and go from a hive.

HIVE: A structure intended for the housing of a bee colony.

HOBBY BEEKEEPING: The keeping of bees subject to the restrictions set forth in

this chapter.

NUCLEUS COLONY: A small quantity of bees with a queen housed in a smaller than usual hive box designed for a particular purpose.

2. REQUIREMENTS; PEMITS, FEES & PENALTIES

a. Bees and bee hives shall be permitted on residential zoning lots containing a minimum of ten thousand (10,000) square feet as an accessory use.
b. A maximum of two (2) hives/colonies shall be permitted on properties zoned and occupied for single family residential uses.
c. The hive(s) shall be located only in the rear yard and a minimum of fifteen feet (15') from all lot lines.
d. A flyway barrier at least five feet (5') in height, consisting of a solid fence, tall bushes, the side of your garage or shed, or anything else that forces the bees to immediately fly up into the air and away from people adjacent to the beekeeping hives.
e. Prominent signage warning of the presence of bees shall be required on the property (i.e., gate).
f. Each hive shall not exceed five feet (5') in height, nor shall the land area designated for the hives exceed thirty (30) square feet in total.
g. A source of water shall be available at all times on the property during the beehive's active months (March - November). Humane conditions are to be maintained year round.
h. All areas where beehives are kept shall be clean and well maintained with no accumulation of bee combs, wax, etc., around the site.
i. An initial building-registration permit shall be required for all hives and an inspection/approval is required prior to obtaining a beekeeping permit.
j. A beekeeping permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.
k. All hives are required to register and maintain requirements with the Illinois Department of Agriculture as required.
l. Sales of honey or anything related to beekeeping are not allowed.
m. On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the hobby beekeeping regulations of this article. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

Hen Coop / Hen Yard SPECIFICATIONS, REQUIREMENTS and GUIDELINES

ADDRESS: _____

SUBMIT THE FOLLOWING (*intake staff* to verify required submittal documents indicated below):

- **Building Permit Application** that is filled out and **signed by owner.**
- **Hen Coop / Hen Yard Specification Sheet** (both pages 1 and 2) filled out and **signed by owner.**
- **Legal Plat of Survey** that is to Scale and indicates All Existing Conditions.
- **Site Plan** (typically, a copy of the plat of survey) indicating the hen coop location and distances to lot lines and other structures (i.e. house, detached garage, shed, etc.)

Hen Coop and Hen Yard Requirements

- An initial hen permit shall be required for approval of hens, coops, and required fencing or screening. Permit application shall be authorized by owner of property. Permit authorizes City staff to inspect property for compliance when deemed necessary. Permit approval is required prior to obtaining hens.
- A hen permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.
- An outdoor area a minimum of ten (10) square feet per hen will be required and a maximum of two hundred (200) total square feet will be permitted for both the covered enclosure / structure and outdoor area. The total height of a coop may not exceed seven (7) feet.
- The raising/keeping of hens shall be permitted on all single-family detached single family residential zoning lots containing a minimum of six thousand (6,000) square feet as an accessory use.
- All hens and enclosures/structures shall be kept/located in the rear yard only.
- Hen coops shall be a minimum ten (10) square feet per hen, and a maximum 200 total square feet and shall be located a minimum of ten feet (10') from all lot lines.
- No more than eight (8) hens per property.
- Roosters are not permitted and hens may not be slaughtered.
- All chicken coops shall require an approved 6-foot screening barrier, located on 3 (three) sides of the coop, within 5 feet from the coop and consisting of a solid privacy fence or 6-foot high arborvitae spaced in zig-zag pattern as not to allow any portion of the coop to be seen. As an alternative, perimeter fencing around the entire yard – six (6) foot high fence shall satisfy the screening requirement.
- No other poultry, including but not limited to geese, ducks and turkeys shall be kept on the property.

Sanitation requirements

- A hen permit issued under this article shall be revoked upon the commission of three (3) violations within a period of twelve (12) months.
- Humane conditions are to be maintained year round.
- Sales of egg(s) or hen(s) or anything related to chicken keeping are not allowed.
- All areas where hens are kept shall be clean and well maintained on a daily basis, with little to no accumulation of waste. In addition, all areas where hens are kept shall not produce or cause odors that are detectable on adjacent properties.

Hen Coop Information:

Coop Size/Dimensions: _____ x _____= SF (Max. 200 SF)

Height_____ (Max 7')

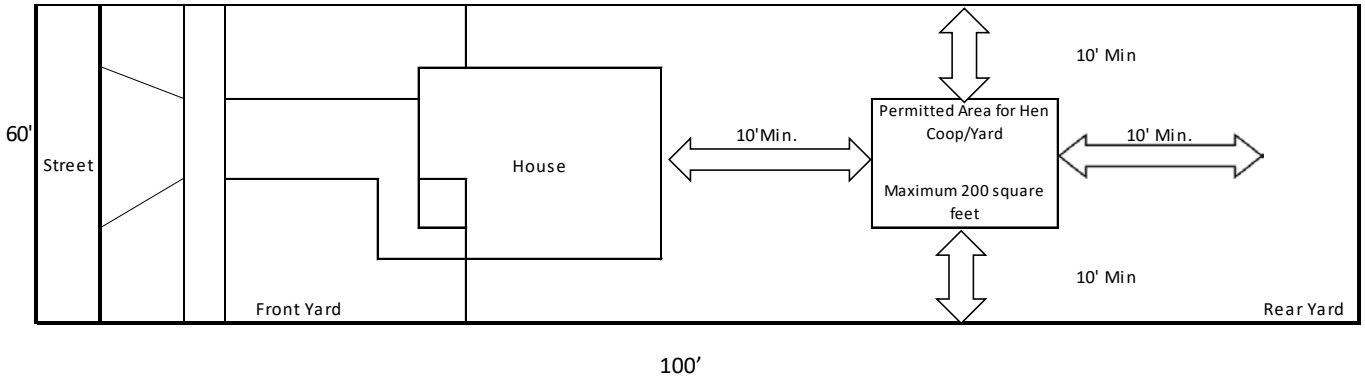
# of Hens _____(Max. 8) (NOTE: **Roosters are PROHIBITED**)

Distance to House _____(Min. 10')

Distance to Lot Lines _____(Min. 10') _____(Min. 10') _____(Min. 10')
Side Rear Side

Hen Coop Material _____

Example Site Plan



YOUR SIGNATURE BELOW ATTESTS THAT THE INFORMATION PROVIDED IS CORRECT AND COMPLIES WITH CITY ADOPTED CODES

AGENT Pinted Name	Agent Signature	Date
OWNER Printed Name	Owner Signature	Date

This document is provided in order to administer general information pertaining to your Permit Application. Additional requirements may be applicable to this project. Please refer to the Community Development Staff for additional information.

On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the keeping of hens. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

BEEKEEPING, SUBJECT TO THE FOLLOWING REGULATIONS AND RESTRICTIONS

ADDRESS: _____

SUBMIT THE FOLLOWING ***(intake staff to verify required submittal documents indicated below):***

- **Building Permit Application** that is filled out and **signed by owner**
- **Bee Hive / Bee Colony Specification Sheet** (both pages 1 and 2) filled out and **signed by owner**
- **Legal Plat of Survey** that is Scale and indicates All Existing Conditions
- **Site Plan** (typically, a copy of the plat of survey) indicating the bee hive location and distances to lot lines and other structures (i.e. house, detached garage, shed, etc.)

Bee Hive and Colony Yard Requirements

- Maximum of two (2) bee hives/colonies shall be permitted on residential zoning lots containing a minimum of ten thousand (10,000) square feet as an accessory use-hives/colony yards shall occur only in rear yards of single family properties.
- The hive(s) shall be located only in the rear yard and a minimum of fifteen feet (15') from all lot lines.
- A flyway barrier at least five feet (5') in height, consisting of a solid fence, tall bushes, the side of your garage or shed, or anything else that forces the bees to immediately fly up into the air and away from people adjacent to the beekeeping hives.
- Prominent signage warning of the presence of bees shall be required on the property (i.e., gate).
- Each hive shall not exceed five feet (5') in height, nor shall the land area designated for the hives exceed thirty (30) square feet in total.
- An initial building-registration permit shall be required for all hives and an inspection/approval is required prior to obtaining a beekeeping permit.
- A beekeeping permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.

Sanitation requirements

- A source of water shall be available at all times on the property during the beehive's active months (March - November). Humane conditions are to be maintained year round.
- All areas where beehives are kept shall be clean and well maintained with no accumulation of bee combs, wax, etc., around the site.
- All hives are required to register and maintain requirements with the Illinois Department of Agriculture as required.
- Sales of honey or anything related to beekeeping are not allowed.

On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the hobby beekeeping regulations of this article. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

BEEKEEPING PERMIT

PERMIT FEE **$25.00**

1. ADDRESS AND APPLICANT INFORMATION

FULL NAME			
ADDRESS			
PHONE (H)		PHONE (C)	
EMAIL			

2. OWNER INFORMATION WHEN APPLICANT IS NOT OWNER

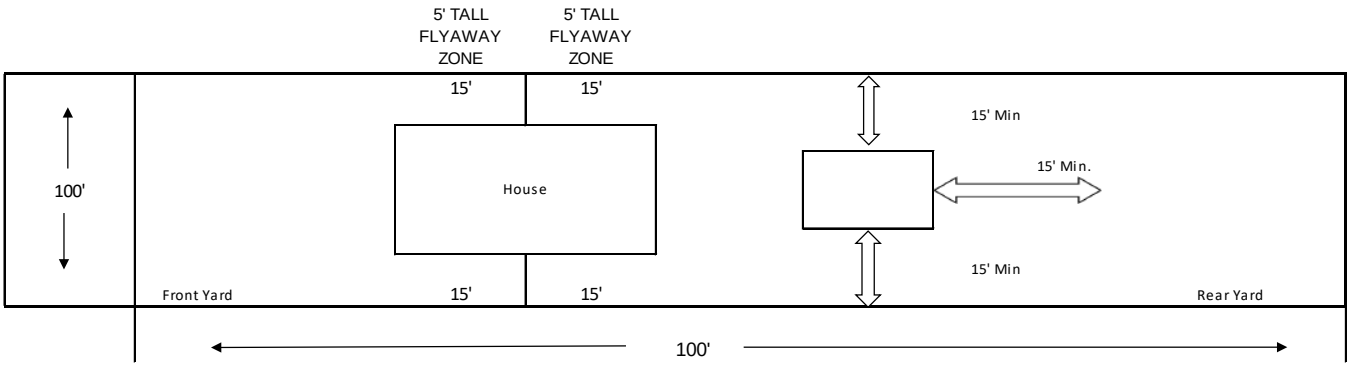
FULL NAME			
ADDRESS			
PHONE (H)		PHONE (C)	
EMAIL			

3. PROPERTY INFORMATION (SITE PLAN REQUIRED)

ZONING DISTRICT	R1 R2 R3		SINGLE FAMILY DETACHED		
LOT SQ FT*		* minimum lot size 10,000 square feet	# OF COLONIES*		* Maximum of 2

4. COLONY INFORMATION

SETBACK DISTANCE 1 (minimum 15' to property line)	SIDE (ft)	REAR (ft)	SIDE (ft)	SETBACK DISTANCE 2 (minimum 15' to property line)	SIDE	REAR	SIDE



5. VERIFICATION

Applicant and Owner agree to allow City staff personnel to access the property for the purpose of verifying complaince with all applicable codes.
BY SIGNING THIS DOCUMENT, I UNDERSTAND AND AGREE TO THE CONDITIONS SET FORTH.

APPLICANT:		DATE:	
OWNER:		DATE:	

OFFICE USE ONLY				1st Violation	2nd Violation	3rd Violation	Revoked	Removed
APPROVED BY:		DATE:						

MEMO

CITY OF DARIEN

DU PAGE COUNTY, ILLINOIS

ORDINANCE NO._____

AN ORDINANCE AMENDING TITLE VII OF THE DARIEN CITY CODE "HEALTH AND SANITATION"

ADOPTED BY THE

MAYOR AND CITY COUNCIL

OF THE

CITY OF DARIEN

THIS_____DAY OF_____, 2020

Published in pamphlet form by authority of the Mayor and City Council of the City of Darien, DuPage County, Illinois, and this ____day of _____, 2020.

AN ORDINANCE AMENDING TITLE VII OF THE DARIEN CITY CODE,

"HEALTH AND SANITATION"

WHEREAS, residents of the City have expressed interest in raising domesticated egg-laying chickens and engaging in the hobby of bee keeping on residential property; and

WHEREAS, these matters are not addressed by the Darien City Code; and

WHEREAS, the Mayor and City Council have concluded that allowing such activities on certain residential property, subject to appropriate regulation, is reasonable;

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF DARIEN, DU PAGE COUNTY, ILLINOIS, IN THE EXERCISE OF ITS HOME RULE POWERS as follows:

SECTION 1: Title VII, "Health and Sanitation" Amended. Title VII of the Darien City Code, "Health and Sanitation," is hereby amended by adding the following Chapter 5, "Animals":

TITLE 7: HEALTH AND SANITATION

Chapter 5: ANIMALS

7-5-1 Chickens

1. DEFINITIONS:

CHICKEN(S): the common domestic fowl.

COOP: Shall mean and include a coop, building, pen or other enclosure, with or without an enclosed pen or hen yard that is designed, constructed and maintained to confine fowl within the coop and to prevent access by predators and trespassers.

FOWL: Any domesticated egg-laying chicken hen and shall exclude all roosters and chicken hens that have ceased laying eggs.

HEN: a female chicken.

POULTRY: domestic fowl, such as chickens, turkeys, ducks, and geese.

ROOSTER: a male chicken.

2. REQUIREMENTS; PERMITS, FEES & PENALTIES

a. The raising/keeping of hens shall be permitted on all single-family detached single family residential zoning lots containing a minimum of six thousand (6,000) square feet as an accessory use.

b. A maximum of eight (8) hens shall be permitted.

c. All hens shall be kept within a coop consisting of a covered enclosure/structure with an attached covered/enclosed outdoor area to prevent hens from encroaching onto neighboring properties.

d. An outdoor area a minimum of ten (10) square feet per hen will be required and a maximum of two hundred (200) total square feet will be permitted for both the covered enclosure / structure and outdoor area. The total height of a coop may not exceed seven (7) feet.

e. All enclosures/structures shall be located a minimum of ten feet (10') from all lot lines.

f. All hens and enclosures/structures shall be kept/located in the rear yard only.

g. All areas where hens are kept shall be clean and well maintained on a daily basis, with little to no accumulation of waste. In addition, all areas where hens are kept shall not produce or cause odors that are detectable on adjacent properties.

h. All chicken coops shall require an approved 6-foot screening barrier, located on 3 (three) sides of the coop, within 5 feet from the coop and consisting of a solid privacy fence or 6-foot high arborvitae spaced in zig-zag pattern as not to allow any portion of the coop to be seen. As an alternative, perimeter fencing around the entire yard – six (6) foot high fence shall satisfy the screening requirement.

i. Humane conditions are to be maintained year round.

j. Roosters are prohibited.

k. Slaughtering is prohibited.

l. No other poultry, including but not limited to geese, ducks and turkeys shall be kept on the property.

m. An initial hen permit shall be required for approval of hens, coops, and required fencing or screening. Permit application shall be authorized by owner of property. The issuance of a permit shall authorize City staff to inspect property for compliance when deemed necessary. Permit approval is required prior to obtaining hens.

n. A hen permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.

o. A hen permit issued under this article shall be revoked upon the commission of three (3) violations within a period of twelve (12) months.

p. Sales of egg(s) or hen(s) or anything related to chicken keeping are not allowed.

q. On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the keeping of hens regulations of this article. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

7-5-2 Hobby Beekeeping

1. DEFINITIONS:

APIARY: A place where one or more bee colonies are kept.

BEE: Any stage of the common domestic honey bee, Apis mellifera species.

BEEKEEPER: A person who owns or has charge of one or more colonies of bees.

BEEKEEPING EQUIPMENT: Anything used in the operation of an apiary, including, but not limited to, hive bodies, supers, frames, top and bottom boards and extractors.

COLONY (COLONIES): A hive and its equipment and appurtenances, including bees, comb, honey, pollen and brood.

FLYWAY BARRIER: Barrier that raises the flight path of bees as they come and go from a hive.

HIVE: A structure intended for the housing of a bee colony.

HOBBY BEEKEEPING: The keeping of bees subject to the restrictions set forth in this chapter.

NUCLEUS COLONY: A small quantity of bees with a queen housed in a smaller than usual hive box designed for a particular purpose.

2. REQUIREMENTS; PERMITS, FEES & PENALTIES

a. Bees and bee hives shall be permitted on residential zoning lots containing a minimum of ten thousand (10,000) square feet as an accessory use.

b. A maximum of two (2) hives/colonies shall be permitted on properties zoned and occupied for single family residential uses.

c. The hive(s) shall be located only in the rear yard and a minimum of fifteen feet (15') from all lot lines.

d. A flyway barrier at least five feet (5') in height, consisting of a sold fence, tall bushes, the side of your garage or shed, or anything else that forces the bees to immediately fly up into the air away from people adjacent to the beekeeping hives.

e. Prominent signage warning of the presence of bees shall be required on the property (i.e., gate).

f. Each hive shall not exceed five feet (5') in height, nor shall the land area designated for the hives exceed thirty (30) square feet in total.

g. A source of water shall be available at all times on the property during the beehive's active months (March - November). Humane conditions are to be maintained year round.

h. All areas where beehives are kept shall be clean and well maintained with no accumulation of bee combs, wax, etc., around the site.

i. An initial building-registration permit shall be required for all hives and an inspection/approval is required prior to obtaining a beekeeping permit.

j. A beekeeping permit issued by the City with a one-time fee of twenty five dollars ($25.00) shall be required. A renewal permit shall be required each year thereafter, with no additional fee or building inspection required.

k. All hives are required to register and maintain requirements with the Illinois Department of Agriculture as required.

l. Sales of honey or anything related to beekeeping are not allowed.

m. On or prior to May 1, 2021 all nonconforming properties must be brought into conformance with the hobby beekeeping regulations of this article. This period is for all purposes deemed an appropriate amortization period for each and every nonconforming property presently located within the corporate limits of the City or hereinafter located within the City by reason of annexation into the City of the lot or parcel on which the uses are located.

SECTION 2: Effective Date. This Ordinance shall be in full force and effect from and after its passage and approval as provided by law.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF DARIEN, DU PAGE COUNTY, ILLINOIS, this ____day of _____, 2020.

AYES: _____

NAYS: _____

ABSENT: _____

APPROVED BY THE MAYOR OF THE CITY OF DARIEN, DU PAGE COUNTY, ILLINOIS, this_____day of_____, 2020.

_____
JOSEPH M ARCHESE, M AYOR

ATTEST:

_____
JOANNE E. RAGONA, CITY CLERK

APPROVED AS TO FORM:

_____
CITY ATTORNEY

MINUTES
CITY OF DARIEN
MUNICIPAL SERVICES COMMITTEE MEETING
July 20, 2020

PRESENT: Alderman Thomas Belczak -Chairman, Alderman Eric Gustafson, Alderman Joseph Kenny, Dan Gombac – Director, Joe Hennerfeind – Senior Planner

ABSENT: None

ESTABLISH QUORUM

Chairperson Thomas Belczak called the meeting to order at 6:45 p.m. at City Hall Council Chambers, Darien, Illinois and declared a quorum present.

NEW BUSINESS

a. Ordinance – Petitioner RETHINK Electric seeks approval to vary Section 5A-5-9-8(B) 5 of the City Zoning Code for relief from the screening requirement for non-flush mounted solar panels at 8131 Lemont Road in Darien, Illinois.

Mr. Dan Gombac, Director reported that the Safeguard Self-Storage facility building sits approximately 75 feet from the primary Lemont Road frontage, and 100 feet from the north road frontage. He reported that the building is unique in that there is no parapet wall at the cap of the building. He explained that Parapet walls typically extend higher than the roof and are often constructed to screen various types of rooftop equipment.

Mr. Gombac reported that the petitioner, Safeguard Self Storage and RETHINK Electric propose to install a solar array in the flat roof of the building.

Mr. Gombac reported that solar panels installed on a flat roof must be installed at an angle, and although not excessive in height, are approximately 14 inches off the roof at the highest point. He further reported that the Code states that panels on a flat roof that are not flush-mounted must have a parapet or screening wall between the panels and the adjacent street and said parapet or screening wall must be at least as high as the panels. Mr. Gombac reported that 14 inches in height and without parapet wall on the building to properly screen the panels, the installation cannot occur without a variation.

Mr. Gombac reported that the PZC approved the petition at their meeting. He reported that the petitioner provided attachments showing how the panels will look have been provided in the packet.

Alderman Gustafson stated that the panels will not be seen and that he has no issues.

Mr. Gombac reported that this is first of its kind.

Alderman Belczak made a motion and it was seconded by Alderman Gustafson approval of an Ordinance to vary Section 5A-5-9-8(B) 5 of the City Zoning Code for

relief from the screening requirement for non-flush mounted solar panels at 8131 Lemont Road in Darien, Illinois.

Upon voice vote, the MOTION CARRIED UNANIMOUSLY.

b. Minutes – June 15, 2020 Municipal Services Committee

There was no one in the audience wishing to present public comment.

Alderman Gustafson made a motion and it was seconded by Alderman Kenny approval of the June 15, 2020 Municipal Services Committee Meeting Minutes.

Upon voice vote, the MOTION CARRIED UNANIMOUSLY.

DIRECTOR'S REPORT

Mr. Gombac had no report.

NEXT SCHEDULED MEETING

Chairperson Belczak announced that the next meeting is scheduled for Monday, August 24, 2020.

ADJOURNMENT

With no further business before the Committee, Alderman Kenny made a motion and it was seconded by Alderman Gustafson to adjourn. Upon voice vote, THE MOTION CARRIED unanimously, and the meeting adjourned at 6:55 p.m.

RESPECTFULLY SUBMITTED:

_____ _____

Thomas Belczak
Chairman

Eric Gustafson
Alderman

_____

Joseph Kenny
Alderman