



Michigan State University Extension
Land Use Series

Sample zoning for agriculture-like and urban agriculture

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Use of this sample zoning text

This Land Use Series publication presents a starting point for what aspects of agriculture can be regulated by local government. A sample zoning ordinance text is provided that accommodates urban agriculture, agriculture in category 4 sites, in communities of over 100,000 population, and agriculture-like land uses. This is intended for use by local planning and zoning officials and others interested in local government accommodating various local food systems.

Thirty seven million acres is
all the Michigan we will ever have”
William G. Milliken

This is a fact sheet developed by experts on the topic(s) covered within MSU Extension. Its intent and use is to assist Michigan communities making public policy decisions on these issues. This work refers to university-based peer reviewed research, when available and conclusive, and based on the parameters of the law as it relates to the topic(s) in Michigan. This document is written for use in Michigan and is based only on Michigan law and statute. One should not assume the concepts and rules for zoning or other regulation by Michigan municipalities and counties apply in other states. In most cases they do not. This is not original research or a study proposing new findings or conclusions.

This topic is relatively new to Michigan with likely change as law and science improves. To reflect the anticipated changes this publication is intentionally labeled as “draft.” The reader should check this website to make sure the most recent draft is being used: <http://lu.msue.msu.edu/pamphlets.htm#AgrUrban>. Appendix D (page 52) list changes made in subsequent updates to this publication.

This sample zoning is not designed to regulate “agriculture” in rural zoning districts, such as working lands, agricultural preservation, agricultural, rural residential, and similar. In those situations local regulation is often at least partly preempted by the Right to Farm Act (see next section). The situations where this sample zoning presents a starting point for local regulation are:

- When the land use is agricultural-like (page 4). That is, it is not agriculture, but has some though not all, of the characteristics of agriculture.
- When the land use is within a municipality with a population of 100,000 or more. This sample zoning ordinance amendment could be adopted to allow for urban agriculture pursuant to the generally accepted agricultural and management practices (GAAMPs) provisions delegating such authority back to local government.
- When the location of the activity is within a “category 4 sites for livestock operations.”

In these cases local government can choose to allow, or not allow animal farming and determine what types of animal farming pursuant to the Site Selection and Odor Control for New and Expanding Livestock Facilities GAAMPs delegating such authority back to local government.

- Certain aspects of farm markets. Certain aspects of farm markets¹ are not considered part of the farm market covered by GAAMPs or are delegated back to local government jurisdiction pursuant to the Farm Market GAAMPs provisions delegating such authority back to local government.
- Other future GAAMPs provisions delegating authority back to local government.
- Local government authority that may be included in a proposed but yet to be written bill for an urban agriculture act. (See Urban Livestock Workgroup Recommendations to Director Clover-Adams and Senator Hune, (page 31).)

¹ These aspects of farm markets are not considered part of the farm market covered by GAAMPs or are delegated back to local government jurisdiction: vehicle access and egress, building setbacks, parking (but not the surface of the parking lot), signs, beer breweries, bonfires, camping, carnival rides, concerts, corn mazes, distilleries, fishing pond, haunted barns/trails, mud runs, play-scapes, riding stables, and winery/hard cider associated with Farm Markets.

Right to Farm Act Preemption

Local regulation of agriculture, farms, and agriculture activity is severely limited in Michigan:

... it is the express legislative intent that this [Right to Farm] act preempt any local ordinance, regulation, or resolution that purports to extend or revise in any manner the provisions of this [Right to Farm] act or generally accepted agricultural and management practices [GAAMPs] developed under this act. Except as otherwise provided in this section, a local unit of government shall not enact, maintain, or enforce an ordinance, regulation, or resolution that conflicts in any manner with this act or generally accepted agricultural and management practices developed under this act.²

The statute does not prohibit local regulation of agriculture. It only prohibits local regulation of agriculture that is already addressed in the Right to Farm Act (RTFA) or in any of the GAAMPs. It is necessary to determine what can be locally regulated and what cannot. Here is a basic thought process you can use to determine how this works:

First, is the land use going to fall under the RTFA? That is, is it a farm or agriculture? Start by asking these questions:

1. Is the land use a “farm operation?” (Defined in the act: MCL 286.472(b).)
2. Is the operation producing “farm products?” (Defined in the act: MCL 286.472(c).)
3. Is it commercial?

If the answer is “yes” to each of these above³ then it falls under the RTFA. The definitions of those terms are very broad and all inclusive. For example “commercial” can be as little as selling one egg in a year; there is no minimum threshold for “commercial.”⁴

A fourth question may also apply. If this fourth question applies, or not, is unsettled law.

4. Does the operation follow GAAMPs?

If the answer is “yes” to each of the four, above,⁵ then the land use or activity applies under the RTFA. Note that following GAAMPs is a farmer’s choice. As a result some attorneys advise against local government treating farmers that opt to follow GAAMPs differently from farmers that choose not to follow GAAMPs in order to avoid unequal treatment under zoning. These attorneys advise giving a “pass” to question four, or always answering it as “yes.” Other attorneys do not share this concern. A local government should consult its attorney, who is experienced in municipal (planning and zoning) law as to how to handle this.

This first step determines if the land use falls under the RTFA. If it does not (one or more of the questions was answered “no”), then the RTFA does not apply, and local regulations do apply. If all three (or four) questions were answered “yes” then RTFA does apply, and certain local regulations are preempted.

² Brackets added, MCL 286.474(6)).

³ The intent of the farm operation or whether it is a “hobby farm” is irrelevant. If it meets the criteria of farm operation, farm product, commercial, the Right to Farm Act applies.

⁴ *Charter Township of Shelby v Papesch*, 267 Mich. App. 92, 704 N.W.2d 92 (2005)

⁵ The intent of the farm operation or whether it is a “hobby farm” is irrelevant. If it meets the criteria of farm operation, farm product, commercial, the Right to Farm Act applies.

The sample zoning text presented here uses this same test (the first three questions) to define “agriculture.” Other land uses are called “agriculture-like” if they meet only two, or fewer of the first three points above.

Second, determine what local regulations are preempted and what local regulations are still enforceable. If the topic of the regulation is already covered in the RTFA or in any of the published GAAMPs, then local government cannot regulate it. If the topic is not in RTFA and not in any of the GAAMPs, then local regulation can still apply.

There is no easy way to review what topics are covered in GAAMPs. The RTFA is easier. Topics in RTFA, and thus off limits for local regulation are:

- Topics about a farmer's liability in a public or private nuisance law suit.⁶
- Topics about enforcement or investigation process for complaints involving agriculture.⁷
- Topic about conversion from one or more farm operation activities to other farm operation activities.⁸

However, GAAMPs cover a much broader range of topics than listed above. Efforts are made to keep GAAMPs up-to-date with the most current science-based best practices for farm operations. It is normal, each year, for advisory committees to the Michigan Commission of Agriculture and Rural Development to review each GAAMPs and update them. Early each year, the Commission adopts updated versions of the GAAMPs. Thus, local zoning authorities should expect revisions and changes to GAAMPs each year.⁹

The sample zoning text presented here uses this same test: If it is “agriculture” then anything in the local zoning (and any other local regulation) that is already covered in the RTFA or in GAAMPs does not apply. If it is “agriculture-like” then provisions of the local ordinance applies.

Third, complicating things further, some GAAMPs delegate regulation authority back to the local unit of government. Examples of this (as of April 2015) include:

- Municipalities with a population of 100,000 or more in which a zoning ordinance has been enacted to allow for urban agriculture (and designates existing agricultural operations present as non-conforming uses).
- Category 4 sites for livestock operations as determined in the Site Selection and Odor Control for New and Expanding Livestock Facilities GAAMPs.
- Vehicle access and egress, building setbacks, parking (but not the surface of the parking lot), signs for Farm Markets as designated in the Farm Markets GAAMPs.
- Beer breweries, bonfires, camping, carnival rides, concerts, corn mazes, distilleries, fishing pond, haunted barns/trails, mud runs, play-scapes, riding stables, and winery/hard cider associated with Farm Markets as designated in the Farm Markets GAAMPs (or not considered as part of the Farm Market GAAMPs).

There are far more nuances to all this, including unsettled case law. Using the following two resources may help organize the thought process of review and help determine what regulations are preempted or not:

⁶ MCL 286.473

⁷ MCL 286.474

⁸ MCL 286.472(b)(ix)

⁹ Bookmarking/favoriting the webpage where current GAAMPs are made available and regularly checking that webpage is wise: www.michigan.gov/gaamps

- What sorts of local regulations are preempted by the Right to Farm Act (RTFA) February 13, 2012: (<http://lu.msue.msu.edu>).
- Public Policy Brief: “Selected Zoning Court Cases Concerning the Michigan Right to Farm Act court cases:” (<http://lu.msue.msu.edu>).

The sample zoning language is based on regulations and issues supported by university expertise or university-based peer reviewed research. The sample zoning also reflects what may be termed state public policy as reflected in Urban Livestock Workgroup Recommendations to Director Clover-Adams and Senator Hune, (page 41).

However research on the topics and regulations provided in the sample zoning was done for commercial farms generally in rural settings. The research is not specific for urban farming. There is very little research specifically on urban agriculture. When the regulation is about interior animal housing it is likely applicable as that need will be the same in a rural or urban setting. When the regulation is about outdoor spaces, setbacks, and so on it may not be a legally defeasible standard.

When the research and state public policy are different, a range, or a choice is presented in this document. This was done because that provides a degree of confidence the regulation will stand up to substantive due process concerns. Other references can be found in Appendix A of this document (page 39) for a local government’s consideration. It is best to review this with the municipal attorney who is experienced in municipal (planning and zoning) law.

Substantive Due Process Limitations on Regulation

When regulating people’s property, one of the major concerns in the United States is that the regulation does not become too restrictive thereby infringing on a person’s private property rights, or regulating in areas outside of what is appropriate for government.

Substantive due process has to do with the substance of the regulation, and that the regulation has a logical connection between the government’s purpose and the regulation itself, and finally that the regulation is the least amount possible while still achieving the public purpose. Substantive due process is one of our constitutional rights found in the 5th and 14th Amendments, Bill of Rights, of the United States Constitution. The U.S. Supreme Court used substantive due process to give added force to the 4th, 5th and 6th Amendments of the U.S. Constitution.

Substance of the Regulation

Not everything is a legitimate subject for government to regulate. For example, local government regulation that infringes on constitutional liberties would be out-of-bounds for a local ordinance.

Commonly, with zoning ordinances, there are sign regulations. The regulation of signs is permissible provided it is about placement, size, lighting and so on. But if the regulation is based on what the sign says, that conflicts with free speech. Thus, regulation of signs must be content-neutral; we do not regulate what the sign says and we do not treat one sign differently than another based on what the sign says.

So the regulation has to have a rational government purpose, or further a legitimate governmental interest.

Regulation Related to Purpose

The second part of substantive due process is that the regulation relates to the government purpose. In simple terms, that means the local government should be able to explain how the regulation accomplishes its purpose or goal. With zoning, in Michigan, one looks to the master plan to contain the goals, objectives, strategies and actions upon which the zoning ordinance (regulation) is based. Within the master plan there are certain elements, comprising the “zoning plan,” which more directly tie regulation in zoning to goals, and objectives in the master plan.

Zoning ordinances include a zoning map dividing the municipality into various zoning districts. The zoning plan elements of the master plan should clearly show how the master plan developed those particular geographic areas – such as text and existing land use maps and analysis, future land use map, projections showing future housing, commercial and industrial needs, natural resource attributes for working lands and so on.

So there needs to be a rational connection between what is trying to be accomplished (legitimate governmental purpose) and the regulation.

Least Regulation

Finally, the rules should be the least amount of regulation possible to achieve the public purpose. If studies and science show a minor regulation will do the job, then that is all that should be required. It would not be appropriate to require additional more regulation.

Master Plan and Research

The documentation of substance of the regulation and how the regulation relates to the public purpose should be reflected in the community’s master plan, or supplement to its master plan. Again, this sample is based on university based research or what may be state policy reflected in Urban Livestock Workgroup Recommendations to Director Clover-Adams and Senator Hune, (page 41).

Applies to Agriculture & Agriculture-like also

Substantive due process deals with the substance of the government regulation. Government may not overly regulate an agriculture-related issue, even if it was not preempted by the Right to Farm Act. It has to be a legitimate government purpose, not contrary to protected constitutional rights and other areas established through our history of court cases. If the regulation of agriculture and agriculture-like activities is about a legitimate governmental purpose the regulation has to logically be related to that government purpose and not off the mark or indirect. The regulation cannot go far and should be the least regulation possible while still accomplishing the public purpose.

Sample Zoning Language

The following is offered as sample ordinance or ordinance amendment language. It is intended as a starting point for a community to use when considering this issue.

This is a sample, meaning that it is not a definitive recommendation by the authors or MSU Extension. A sample is a starting point for discussion and development of a ordinance, ordinance amendment, or zoning ordinance amendment that is appropriate for a particular community. Conversely a model ordinance, or amendment, would be presented as the ideal or utopia intended as a recommended approach. This is not a model ordinance, or ordinance amendment. That means any numerical standard (dimensional standard) offered in the sample zoning amendment is just a starting point for discussion. Often there is already discussion about the standard in the commentary which is intended to provide a community with information to decide what the numerical standard should be for a particular community.

This document is written for use in Michigan and is based only on Michigan law and statute. One should not assume the concepts and rules for an ordinance or zoning by Michigan municipalities and counties apply in other states. In most cases they do not.

If zoning exists: If this is being done in a city, village, township, or county with its own existing zoning, then these provisions must be adopted pursuant to the Michigan Zoning Enabling Act. A step-by-step checklist of procedures to amend a zoning ordinance is available from Michigan State University Extension's *Land Use Series*: "Checklist # 4: For Adoption of a Zoning Ordinance Amendment (including some PUDs) in Michigan" is available from www.lu.msue.msu.edu.

Township with county zoning: If this is being done in a township that relies on county zoning, then the township must work with the county planning commission so these provisions are placed in the county's zoning ordinance pursuant to the Michigan Zoning Enabling Act. Checklist #4 is also applicable here.

Zoning done by a Joint Planning Commission: If this is being done in a municipality that relies on joint zoning, then the municipality must work with the joint planning commission so these provisions are placed in the joint zoning ordinance pursuant to the Michigan Zoning Enabling Act, Municipal Joint Planning Act, and the Joint Planning Ordinance and Agreement. Checklist #4 is also applicable here.

Zoning does not exist: If this is being done in a township, village or city where zoning does not exist, then it is not possible to adopt these regulations apart from the adoption of a complete zoning ordinance establishing rules and creating the public offices and bodies necessary pursuant to the Michigan Zoning Enabling Act.

There are many different ways for a zoning ordinance to deal with the issues outlined here. The sample provided here is just one. It is written with the following assumptions:

1. The municipality already has a site plan review process in its zoning ordinance.
2. The section numbering system follows the standard system of codification presented in Michigan State University Extension's *Land Use Series*: "Organization and Codification of a Zoning Ordinance", available from lu.msue.msu.edu.
3. The municipality's attorney whom is experienced in municipal law (planning and zoning) will review any proposed amendments before they are adopted.

Following are the sample zoning ordinance [amendments] with commentary.

How to Review the Sample text

This sample is overwritten for any one local government. The intent is to address as many situations as possible and minimize the need for additions.

This sample text will need to be edited to conform with the style of writing used in the zoning ordinance being amended. Also work with your municipal attorney so he or she is comfortable with the text to be adopted. Some attorneys want detail (closer to how this sample was written) and some attorneys want simplicity – reducing the likelihood of conflicts within the zoning ordinance.

In virtually all local governments the final version of the zoning amendment will be shorter and simpler than what is presented here.

This sample is also written to cover many aspects of the topic. This aspect also needs to be reviewed. Some communities may wish to only allow crop-based agriculture-like land uses. Others may want to allow crops and poultry or crops and all small animals.

For example a community that wishes to only allow crop agriculture in an urban-like area might adopt sections (§) §1; §2 A, B, C, D, G; and §4-9. A community that wishes to include only crop and poultry might adopt §1; §2 A, B, C, D, E1, E2, G; and §4-9. A community that wants to allow everything except large farm animals might adopt §1; §2 A, B, C, D, E1, E2, E3, F, G; and §4-9.

The Michigan Zoning Enabling Act,¹⁰ requires that local government zoning provide for all lawful land uses somewhere within the political jurisdiction where there is a demonstrated need.¹¹ Michigan local governments with zoning authority may want to engage in a planning process to consider where agriculture is and is not appropriate in urban areas and in consideration of the need to protect public health, safety, and welfare.

Further, potential environmental and health impacts may amount to designation of some areas of a community off limits for food production. Addressing these concerns and this balance is one of the purposes of zoning.

There is good reason for advocates of community food systems and local officials to begin meaningful discussions on this subject. A best practice approach would be to organize constructive conversations with diverse interests in the community as a start to the planning process. These conversations should cover two things. 1) include a review and update of the master plan, if needed, and 2) involve reviewing of the sample zoning text found here. Conversations should include the following individuals:

- Professional planners (staff or consultant)
- Planning commission member(s)
- Elected official(s)
- Small farmers
- Farmers market manager
- Food co-op representative
- Chamber of commerce representative
- Sewer system and storm sewer operator
- Local foods initiative group
- Traditional restauranteurs
- Retail grocers' representative(s)
- Food bank representative(s)
- Neighborhood association or representatives
- USDA district conservationist or soil scientist

¹⁰ MCL 125.3101 *et seq.*

¹¹ MCL 125.3207

- MSU Extension educators specializing in agriculture
- Local government's attorney
- Others

This process may benefit from facilitation by an outside group such as Michigan State University Extension educators with expertise in civic engagement, conflict resolution and facilitation.

Outline of Sample text

The sample zoning text is organized as follows. First are general regulations which would apply to all types of farming in urban, residential, or commercial areas. Then it speaks to regulations which are specific to certain types of farming: crop, poultry, small animal, large animal, aquaculture.

The order of types of agriculture in the sample ordinance is to present the topics from what many would consider a type of farming that would be the least intrusive or conflicting with residential land uses to most intrusive or conflicting. A community may want to edit this sample to not allow some or all of what it considered to be too intrusive.

§1. Introduction and deleting old sections

§2. Definitions

§3. (10XX) (The new section added to the zoning ordinance on this topic.)

A. & B. Basic rules, as to when the ordinance regulation applies versus when RTFA and GAAMPs applies

C. 1-4. Regulations that apply to all agriculture-like land uses.

5. Soil testing (contamination)

6. Nutrient storage, etc.

7. Buffer, chemicals

8-13. Other miscellaneous provisions

14. Water, storm drains, sanitary sewer, runoff

15. Complaint resolution

D. Crops

1. Regulations that apply to all crops

2. Specific to community garden, market garden

3. Specific to building dependent and indoor farming

4. Specific to bees

E. Animals

1. Regulations that apply to all animal operations

2. Specific to poultry operations

3. Specific to small farm animal operations

4. Specific to large farm animal operations

F. Regulations for Aquaculture operations

G. Regulations for farm markets

§4. (80XX) Nonconforming language for urban areas using the 100,000 rule.

§5. (8404) Language indicating gardens are not regulated.

§6. Language to indicate which zoning districts this applies to

§7-9. Other ordinance detail

Key

In some areas of the sample zoning text, there is more than one possible recommendation, or areas where research or local policy leads to indicating what numerical requirement should be inserted in the proposed zoning ordinance amendment. When that is the case, the following font and bracketing is used to help the reader know which recommendations are from what sources.

- **Areal text:** The sample zoning text is presented Areal text like this, reflecting the recommendations of the co-authors and others (page 38).
- Californian FB text: Explanation is presented in a Californian FB style typeface in the “commentary” boxes, like this.
- [Small Areal text]: Smaller sized text within brackets, [like this], are situations where a guideline or recommendation is not offered. These should be edited to reflect local policy.
- {in French brackets}: Text within French brackets, in the right column {like this} and the left column {like this}, reflect guidelines or recommendations from the Urban Livestock Technical Workgroup Report (page 41), which are different than the above.
- |within straight lines|: Text within vertical lines, |like this|, is from Michigan State University Extension Bulletin E-3136 Suggestions for Ordinances Allowing Backyard Poultry, Karcher, Wylie, Fulton; (October 2010) (page 33).

Upon local review with local interested persons (those on page 6) the sample zoning text should be edited to omit so only one option is left that reflects desired local policy. This sample zoning text should be edited so it deletes options so only one option remains as part of the adopted zoning.

Sample Zoning Amendment

AN ORDINANCE TO AMEND IN PART AN
ORDINANCE ENTITLED "ANYTOWN MUNICIPALITY ZONING
ORDINANCE" WHICH WAS ADOPTED [_DATE_], AS AMENDED,
TO REPEAL PROVISIONS OF THE ORDINANCE ON FARM AND AGRICULTURE,
AND TO REPLACE IT WITH ADDED CERTAIN DEFINITIONS,
TO ADD CERTAIN AGRICULTURE REGULATIONS, AND
TO SPECIFY ZONING DISTRICTS WHERE AGRICULTURE IS ALLOWED

THE MUNICIPALITY OF ANYTOWN, [_name of county_], MICHIGAN, ORDAINS:

1. The Municipality of Anytown Zoning Ordinance of [_date_], as amended, (hereinafter the "Ordinance") shall be amended to delete all sections that currently address farming, agriculture and similar to be replaced with the content of this Ordinance. The current section which are deleted hereby are the following:

- i. [_list the sections being deleted_]

The sections being changed or added to the ordinance are as follows, to wit:

2. The Ordinance shall be amended to add the following definitions [_], as follows, to wit:

AGRICULTURE means a land use which includes all of the following: (1) a farm operation, (2) producing a farm product, and (3) as commercial activity. The land use also includes accessory uses for housing and dwellings for the farmer and farm employees.

AGRICULTURE-LIKE means one of the following:

A. A land use which may be the principle use or accessory use on a parcel which includes some, but not all, of the following: (1) a farm operation, (2) producing a farm product, or (3) commercial activity, or

B. Any agriculture or agriculture-like land use where the Right to Farm Act (M.C.L. 286.471 et seq.) or GAAMPs delegates regulatory control back to local government, such as but not limited to agriculture considered to be in a Category 4 Site, as used in the Site Selection and Odor Control for New and Expanding Livestock Facilities GAAMPs adopted April 28, 2014.

ANIMAL means a farm animal, pet, but not animals used for research in a scientific laboratory, or specimens in a zoo, or wild animals in a rehabilitation facility.

COMMERCIAL in the context of a farm operation means performing commercial production of any amount, without any minimum threshold of commercial activity.

Commentary: The definition of "commercial" which is used here is derived from case law. As the case law evolves, this definition may need to be updated by zoning amendment or may be subject to more recent court rulings. [End of commentary]

COMMUNITY GARDEN means a collective activity by a group of people, utilizing either individual or shared plots to grow food crops, plant fiber, ornamentals, or other plants for personal or institutional use, consumption, or donation. Community gardens may include common areas maintained and used by group members.

FARM ANIMAL means domestic animals; exotic animals; any other animal so long as the animal is kept for the purpose of a farm product, for farm operation, or service to humans. Farm animal does not include animals used for research in a scientific laboratory, or specimens in a zoo, or wild and other animals in a rehabilitation facility.

FARM MARKET means a part of a farm operation which is a place or area where transactions between a farm market operator and customers take place seasonally or year-round. This includes roadside stands, farm stands, an area without a physical structure, a temporary structure such as a tent, etc., where at least 50 percent of the products or name-sake products marketed and offered for sale (measured as an average over the farm market's marketing season or up to a five-year time frame) are produced on and by the affiliated agriculture establishment. (primary measure of the 50 percent will be the percentage of the retail space used to display products and name-sake products offered for retail sale. If measurement of retail space is not feasible, then the percent of the gross sales dollars of the farm market will be used.) Farm products may be processed more extensively into a form that adds value and makes them more marketable for direct customer sales. at the farm market, as long as allowed by law. Farm markets may include marketing activities and services to attract and entertain customers and facilitate retail trade business transactions.

Commentary: The definitions of “agriculture,” “agriculture-like,” “commercial,” “GAAMPs,” “farm operation,” “farm product” should not be changed if using this sample zoning language.

“Garden” (as defined here) is the part of a yard, landscaping, and flower and plant beds typically found around a home or business which is typically not subject to attention or regulation by a zoning ordinance. It might or might not include growing food, but in any case is not done as an agricultural or agricultural-like endeavor.

The following definitions might be understood more easily if “paired” together as follows:

- Agriculture, Agriculture-like, commercial, GAAMPs, farm operation, farm product.
- Animal, farm animal, pet.
- Garden, community garden, market garden.

[End of commentary]

FARM OPERATION means the same as defined in the Michigan Right to Farm Act, M.C.L. 286.472(b).

FARM PRODUCT means the same as defined in the Michigan Right to Farm Act, M.C.L. 286.472(c).

GAAMPs means generally accepted agricultural and management practices as defined in the Michigan Right to Farm Act, M.C.L. 286.472(d).

GARDEN means an accessory use which is the growing of plants for landscaping purposes which may consist of any plant (flowers, bushes, hedges, arbors, trees, groundcover, manicured lawn); food (vegetable, fruits, herbs); fibers; garden maintenance facilities (potting work area, composting); greenhouse, hoop house, and other structures subject to applicable setback, height, parcel coverage, and other regulations; and including other landscape features such as but not limited to paths, walls, rocks. A garden is not commercial. A Garden is not Agriculture, Agriculture-like, community garden, market garden.

MARKET GARDEN means an activity where food crops, plant fiber, ornamentals, or other plants are grown by an individual or a group to be sold for profit.

PET means domestic animals primarily for a person's company, companionship, performance, attractive appearances, loyalty, for human therapy, playful personalities, or is a service animal pursuant to MCL 287.291. Pet does not include working animals, farm animal, animals used for research in a scientific laboratory, or specimens in a zoo, or wild and other animals in a rehabilitation.

WOODY PLANT MATERIAL means vegetation characterized as having a wooden stem or trunk (as opposed to a fibrous or grass stem) and shall include those plantings recommended in *Lakeland Report Number 12 on Greenbelts; A Circle of Protection For Inland Lakes* prepared by University of Michigan Biological Station, Douglas Lake, February 1979.

3. The Ordinance shall be amended to add Section [in general provisions], as follows, to wit;

10XX. Agriculture and Agriculture-like requirements

- A. An agriculture land use shall comply with all the requirements of Section 10XX. of this Ordinance except that if the subject of the regulation in this Ordinance also appears in any of the current GAAMPs, or is contained in the Right to Farm Act (MCL 286.471 *et seq.*) then regulations of this Ordinance on the same topic shall not apply.

Commentary: “Agriculture” land use, as defined in this sample ordinance and referenced here would be those farms which have Right To Farm Act (RTFA) protection, and certain local regulations would be preempted. Preempted are any regulation dealing with a topic that is already covered in the RTFA and GAAMPs. There is not any local discretion over such regulation. This sample ordinance reiterates statute and case law on this subject. [End of commentary]

- B. An agriculture-like land use shall comply with all the requirements of Section 10XX. of this Ordinance, and shall comply with all applicable GAAMPs. In the case that the subject of the regulation in this Ordinance also appears in any of the current GAAMPs or is contained in the Right to Farm Act (MCL 286.471 *et seq.*), then regulations of this Ordinance on the same topic shall apply and supersede those of any GAAMPs or the RTFA where a conflict exists. If this Ordinance is silent on a topic that is covered by a current GAAMPs, then the practices in that GAAMPs shall be a requirement of this Ordinance.

Commentary: “Agriculture-Like” is intentionally defined and used here as an activity that does not qualify for RTFA preemption from local regulation. Thus Agriculture-Like land uses can be regulated above and beyond what is found in the RTFA and GAAMPs. An example of an Agriculture-Like land use might include plant or animal production by a retail food establishment that is using the product(s) in preparation of food sold to customers. Or, it might include plant or animal production by a non-profit organization that is raising food for donation or sale to the public at a subsidized price. Note the distinction from Garden activity. Local government does have discretion to regulate these land uses. [End of commentary]

C. Requirements for all Agriculture and Agricultures-like land uses:

1. All setback, and all other applicable standards in the respective zoning district and overlay district.
2. All applicable general regulations standards in article 1001. *et seq.* of this Ordinance.
3. If applicable for a special use, the general special standards in Section 8609. of this Ordinance and specific special use standards in Section 1601. *et seq.* of this Ordinance.
4. The Agriculture and Agricultures-like land uses are only allowed in zoning districts where these land uses are specifically named as a permitted use or possible special use.
5. Soil testing for contaminants in urban environments.
 - a. A phase one environmental site evaluation shall be submitted with the zoning application. The evaluation shall include:
 - i. History of the site and surrounding area listing all potential soil contaminants suspected from past and current land uses based on “Sources of Contaminants in Soil”, Appendix A, of *Urban Livestock Technical Workgroup Report*, (An appendix to Urban Livestock Workgroup Recommendations to Director Clover-Adams and Senator Hune)).
 - ii. Representative sampling soil test results for the site which includes testing for likely contaminants based on the history of the site and for lead based on soil testing protocol developed by Wayne State University published in *Risk Analysis* “Spatial Variation of Soil Lead in an Urban Community Garden: Implications for Risk-Based Sampling” Volume 34, Issue 1, January 2014, Pages 17–27; and soil testing protocol for cadmium and arsenic based on *Urban Agriculture in Michigan, Things to consider about soil and water; Working with Soil in Urban Areas*; and Interstate Technology regulatory Council’s (ITRC) *Incremental Sampling Methodology* and specific instructions from the laboratory conducting the soil analysis.

Commentary: This soil testing requirement is very important. It is strongly recommended to be included. Contaminants can be present in soil in harmful amounts due to natural background, or human activity. Soil contamination in urban areas are more likely to be present. Because some contaminants can be taken up by plants, it is possible to produce contaminated fruits and vegetables.

Livestock eat dirt as they graze and poultry can peck at the ground, which can create dust that when inhaled can contaminate meat or other animal products, like eggs and milk. Understanding the potential constituents of your soil is an important part of determining if the site being considered for growing food or raising certain livestock is appropriate.

Wayne State University researchers have developed a testing protocol that results in 95 percent certainty of detection of lead in urban soils (see page 31). Requiring this testing standard for lead is recommended. For other elements use “Things to consider about soil and water; Working with Soil in Urban Areas; and Interstate Technology regulatory Council’s (ITRC) *Incremental Sampling Methodology*” especially for older urban areas (see page 31).

For more detailed information on urban farming soil testing see Appendix C, page 50. [End of commentary]

- b. The site shall not be used for agriculture or agriculture-like unless it meets one of the following

- i. Soil test results show at or below safe concentrations of soil contaminants as shown in Appendix B, of Urban Livestock Technical Workgroup Report, (An appendix to Urban Livestock Workgroup Recommendations to Director Clover-Adams and Senator Hune))
 - ii. Contaminated soil has been removed and replaced with clean soil
 - iii. A barrier is placed between contaminated soil and crops and livestock. The barrier shall be sufficient layer(s) of clean soil, concrete, geotextile fabric, rock, and the barriers shall be continuously inspected and replaced as needed.
 - iv. Use of raised beds.
 - v. Keep livestock and crops above the contaminated soil.
6. Storage and stacking of nutrient sources (manure piles, chemical or organic fertilizers) shall be set back 100 feet from any surface water. Within 10 feet of the water's edge (or landward beach/vegetation line) a vegetation belt shall be maintained by not removing trees with a trunk diameter of three inches at chest height, or greater, unless dead or chronically diseased. Trees and other woody plant material of a smaller diameter at chest height (4½ feet), shall not be removed, except to prune or clear a filtered view of the water body. It shall be the landowner's responsibility to maintain this vegetation belt in a healthy state.

Commentary: For more information on ground-, surface-water protection see Land Use Series "Groundwater and surface water protection"

<http://lu.msue.msu.edu/pamphlet/Zsp/AcrobatPamphletGroundwater.PDF> (found at web page lu.msue.msu.edu).

This sample zoning uses the term "surface water." It is assumed that is already defined in the zoning ordinance, or a similar term is used. [End of commentary]

7. Buffer; organic and inorganic chemicals:
- a. Application of chemical or organic fertilizers, nutrients, pesticides, herbicides, fungicides, and similar products shall not take place within 10 feet from a property line and shall be further buffered from that property line with a 10 foot vegetation belt adjacent to the property line which shall be maintained by not removing trees with a trunk diameter of three inches at breast height, or greater, unless dead or chronically diseased.
 - b. Trees and other woody plant material of a smaller diameter at breast height (4½ feet) shall be established or retained.
 - c. In the buffer area it shall be the landowner's responsibility to maintain this vegetation belt in a healthy state. This setback and vegetation belt may include pedestrian, automobile and equipment ingress and egress.
 - d. This setback and vegetation belt requirement does not apply to a property line which is adjacent to another Agriculture and Agriculture-like use. This setback and vegetation belt requirement does not apply to a garden and yard.
 - e. Individuals using or supervising the use of restricted-use pesticides for the purpose of producing an agricultural commodity on their own lands or their employer's land, or on land rented to them shall be certified Private Applicators by the Michigan Department of Agriculture and Rural Development. Individuals authorized to apply general-use and restricted-use pesticides for a commercial purpose, or as a scheduled and required work assignment in the course of his or her employment shall be certified Commercial Applicators with the applicable

category(ies) of certification pursuant to MCL 324.8311 et seq., part 83 of the Natural Resources and Environmental Protection Act (PA 451 of 1994, as amended)

8. The property shall be maintained free of high grass (with the exception of the setback-buffer or vegetation belt area as specified in section 10XX.C.5.e. of this Ordinance and purposely cultivated native species, which shall be allowed), weeds, or debris. Dead garden plants shall be cut back at or near the ground or removed regularly, and in any instance, no later than 60 days after the average date for the first killing frost as established for the Agriculture or Agriculture-like location by the National Weather Service, National Oceanic and Atmospheric Administration.
9. Plants from cultivated areas shall be prevented from encroaching onto adjacent properties or onto the public right-of-way.
10. Agriculture and Agriculture-like uses shall not be detrimental to the physical environment or to public health and general welfare by reason of excessive production of noise, smoke, fumes, vibrations, or odors.
11. Tools, supplies, and machinery shall be stored in an enclosed structure or removed from the property daily. All chemicals and fuels shall be stored off the ground, in an enclosed, locked structure that is designed as a secondary containment for groundwater protection.

Commentary: For more information on secondary containment see Land Use Series “Groundwater and surface water protection” <http://lu.msue.msu.edu/pamphlet/Zsp/AcrobatPamphletGroundwater.PDF> (found at web page lu.msue.msu.edu). [End of commentary]

12. Motorized equipment within a residential zoning district or residential planned development district shall be restricted to hours beginning at 8am and ending at 8pm Equipment, such as fans, necessary for the operation of greenhouses is exempted from this provision.
13. If temporary restroom facilities are provided on site, they shall be screened on at least three (3) sides from public view by an opaque impact-resistant fence of sufficient height to screen the facility(ies).
14. Water protection
 - a. Surface water and drain isolation. Nutrient sources shall be 100 feet from any surface water, county drain, and wetland boundary. As used here nutrient sources includes but are not limited to pasture systems, manure land application, stacked solid manure, treatment systems, lagoons and storage basins, manure as fertilizer application, and runoff retention basins.
 - b. Runoff. No runoff from nutrient sources shall be allowed to leave the parcel, except as provided in 10XX.C.14.c. of this Ordinance. A drainage plan shall be prepared and approved prior to issuance of a zoning permit showing existing and proposed topography, retention areas or basins, calculations and other engineering for peak discharge rates, and other information required elsewhere in this Ordinance or other applicable ordinances.

Commentary: The concern is the distinct likelihood of runoff from urban farms getting into the storm sewer system and thus into the local streams as well as discharge into surface water and wetlands. Such runoff should be classed as an “illicit discharge” under Part 81 of the Natural Resources and Environmental Protection Act (MCL 324.8101 et seq.)

The sample zoning ordinance, here, suggests a 100 foot setback. That could be modified to instead say their shall be “no runoff” at all. The issue with this approach would be how this

would be enforced. One might modify the 100 foot setback to a greater or smaller number. The recommendations will be different for different parts of the state and will depend on the soil type(s) and slopes found within the municipality. Consult the Web Soil Survey <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm> for more information. [End of commentary]

- c. Storm sewer and drain protection. In areas where storm sewer and sanitary sewer systems are separated no runoff shall discharge into a storm sewer or drain system. No runoff shall discharge into a sanitary sewer system unless approved as a customer by [the operator of the sewage treatment plant, e.g., Director of Public Works].
- d. Sanitary sewer. In areas where storm sewer and sanitary sewer are not separated no runoff from nutrient sources shall discharge into the sewer system.

Commentary: In areas where combined sewers have been separated, medium to large urbanized areas are now held to federal stormwater discharge permit requirements, which explicitly prohibit illicit discharges to the storm drains. Those communities are regulated as municipal separate storm sewer systems (MS4s). A municipality may already have such a prohibition of discharge into storm sewers in place via another ordinance. If that is the case this zoning amendment need only cross-reference the other ordinance. The following is a link to the Michigan Department of Environmental Quality (DEQ) storm water web page for more information on this topic: http://www.michigan.gov/deq/0,4561,7-135-3313_3682_3716---,00.html

For information about stormwater regulations in your area, contact your district DEQ staff. Contact information can be found at: http://www.michigan.gov/deq/0,4561,7-135-3313_3682_3716-24454--,00.html

It is not likely urban farms would be directly plumbed to a sanitary sewer system. But there are situations (in-building operations, aquaculture, etc.) where it may be needed. If connected to sanitary sewer system the effluent composition should be required to be reviewed by the treatment plant operator and approved as an incoming effluent including, if necessary a pre-treatment requirement. Other municipal ordinance or state statute provide the waste water treatment facility control of what (and how much) is “sent” to them.

(Source, MSU Institute of Water Research & Department of Community Sustainability, Dr. Ruth Kline-Robach.) [End of commentary]

- 15. Complaint Resolution: agriculture-like operations shall have a [pick one: planning commission or zoning administrator] approved process to resolve complaints from nearby residents concerning the construction or operation of the project.

Commentary: This is an option that may be included or left out. One should consult with their municipal attorney about the desirability of having this sort of dispute resolution system in place. Or create a single process to resolve complaints that uniformly apply to all agriculture-like operations.

One option for an approved complaint resolution process between neighbors would be to use the Michigan Agricultural Mediation Program (<http://www.agmediation.org/>). Mediation can include various “other agriculture-related topics,” – any agricultural dispute. The ordinance can be worded, as found to the left, or could specify use of this program. [End of commentary]

D. Crops.

1. Requirements for all crop agriculture and agriculture-like land uses: Production of food, fiber, and plants for other products (including but not limited to community gardens, Agriculture, Agriculture-like, market gardens (but not gardens)) shall comply with the following.

Commentary: If crops are not to be allowed anywhere as an “agriculture-like” land use, then this part should be deleted.

Note the distinction between “gardens” and “agriculture” and “agriculture-like,” and that gardens are exempt from zoning permits (page 11 and 14 of this sample amendatory ordinance).

“Community garden,” “market garden,” are different from a “garden” and subject to regulation here. [End of commentary]

- a. The property shall generally be maintained in an orderly and neat condition.
 - b. Compost and fertilizer storage shall not be located in a front yard and at least [_insert distance_] feet from the nearest principal residential structure.
 - c. Farmers markets are permitted as an accessory use where located on the same parcel as religious institutions, schools, outdoor recreation facilities, and non-profit neighborhood centers.
2. Community garden and market garden.
 - a. Only the following accessory uses and structures are permitted for a community garden:
 - i. Greenhouses, hoopouses or high tunnels, and similar structures used to extend the growing season;
 - ii. Benches, bike racks, raised/accessible planting beds, compost bins, picnic tables, garden art, rainwater catchment system;
 - iii. Tool sheds and shade pavilions;
 - iv. Garages
 - b. Farmers markets are permitted as an accessory use where located on the same parcel as a community garden sponsoring organization, religious institution, school, non-profit neighborhood centers, parks, and public land subject to section 10XX.G. of this Ordinance.

Commentary: “Garden” greenhouses, hoopouses, and high tunnels under a certain size might be allowed without permit. Ensure plastic material for these structures are allowed. If the ordinance has a small size building threshold where permit is not required, that same size should apply here. A community may wish to include maximum sizes for these structures.

Note: “Farm Market” and “Farmers Market” are two different things. A farm market is associated with an individual farm (agricultural operation) and is governed by the Farm Markets GAAMPs. Farmers Market is an organized periodic event where more than one farmer, sells farm products at the same location and time. [End of commentary]

3. Community garden and market garden on a building roof, inside a building, vertical farming, and other building-dependent farming (including but not limited to aquaponics, hydroponics, cold storage, processing).
 - a. __ [INSERT REGULATIONS HERE] __

Commentary: The option to regulate indoor agriculture and/or “processing” is something that may be included or left out of this amended section of the zoning ordinance. It may be more appropriate to add indoor agriculture as a permitted or special use in a manufacturing (or other) zoning district. [End of commentary]

- b. A zoning permit shall be issued with the condition there is a finding by the building inspector that the structure upon which the farming takes place meets construction code for the intended use.

Commentary: The construction code permits, not zoning, control structural integrity. Construction code permits are issued after the zoning permit is issued. [End of commentary]

4. Bees.

- a. Before introduction, broodless hive bees, and packages shall be decontaminated for mite control at pickup locations. For all bees continued treatment for mites shall be done before being hived, and during hive activity monitoring. Use of miticides, antibiotics, and insecticides for the management of the following, but not limited to, mites, the small hive beetle (*Aethina tumida*), brood diseases, and microsporidian parasites shall be done. Use of dietary supplements for stimulating hive buildup and to maintain colony health shall also be used as needed.
- b. Beekeepers shall maintain splits, swarm traps, and constant vigilance in spring and early summer to control swarming. If swarming is not prevented the beekeeper shall have a written plan for swarm rescue and placement in a quarantine yard.
- c. Hives shall be located not closer than 200 feet from parcel lines or another’s dwelling. The distance from parcel lines may be reduced to the respective setback required in the zoning district for the hive(s) if a six foot high flyway barrier is located along or near the property line(s) consisting of a solid fence, wall, or dense vegetation that prevents a direct line of flight from the hives into neighboring properties, elevated living areas, sidewalks, public and private for public use right-of-ways.
- d. Density of hives per area of the parcel shall comply with the practices presented in the GAAMPs for the Care of Farm Animals.
- e. A hive shall not exceed 20 cubic feet in volume.

Commentary: Having successful crop, or plant agriculture, especially for “Community garden” and “market garden,” depends on also having bees. One cannot have local food without local bees. It is necessary (important) to allow beekeeping in proximity to urban agriculture, community gardens, and the like.

For information on encouraging pollinators in an urban-like environment see: *Protecting and enhancing pollinators in urban landscapes*, MSU Extension bulletin E3314 (page 43).

Effects of bee stings will vary from person to person, but dangerous to only a small percent of the population. For more on this concern see: USDA Agricultural Research Service, honey bee research: <http://www.ars.usda.gov/Research/docs.htm?docid=11067>; E. Crane; 1990 *Bees and beekeeping: Science, practice, and world Resources*; Ithica, NY. Constock; J. Tautz, 2008; and *The buzz about bees. Biology of a superorganism*; Berlin.)

Setbacks and hive density in the sample zoning are from the *Care of Farm Animals GAAMPs*. Readers may wish to review GAAMPs for more information. [End of commentary]

E. Requirements for all Farm Animal Agriculture and Agriculture-like land uses:

Commentary: If all animals (poultry, small and large) are not to be allowed anywhere as an “agriculture-like” land use, then this part should be deleted.

There are concerns about livestock in urban areas introducing diseases which are harmful to humans. Prevention and treatment of zoonotic diseases (those that can be passed from livestock to humans) should be required in addition to measures that ensure sound animal well-being.

See: www.michigan.gov/mda-animalid for specifics about ear tags. [End of commentary]

1. Farm Animal Health

- a. A management practices plan created in consultation with a veterinarian for animal health shall be maintained and followed. Such plan shall include:
 - i. Use of veterinary drugs as recommended by the veterinarian;
 - ii. Animal health monitoring;
 - iii. Rabies monitoring;
 - iv. Ongoing working relationship with a veterinarian;
 - v. Use of drugs as specified on the Food and Drug Administration label or extra label with prescription by a veterinarian or under direct supervision of a veterinarian with a valid veterinarian-client-patient relationship.
- b. Products from a drug treated animal shall not be produced, sold, or given away until after the withdrawal time has lapsed.
- c. All reportable animal diseases (based on the most recent Michigan Reportable Animal Diseases List) shall be reported to the state veterinarian when suspected or confirmed to be present in one or more animals.
- d. Each site shall have a premise identification number for the site, if applicable, and each animal that is required to shall have an official identification (ear tag).
- e. Animal feed shall be stored to prevent spoiling, and contamination, (mold, etc.), and used prior to its expiration date. Storage shall be in secured container(s) to prevent attraction of rodent, bird, wildlife, insects (all of which can contaminate feed with feces, saliva, microbial growth).
- f. Leftover feed shall be cleaned out and disposed of in a secured container to prevent attraction of rodent, bird, or other wildlife.
- g. Owners shall take steps to avoid the buildup of flies and maggots by keeping litter and feed dry and promptly disposing of animals.
- h. Owners shall practice rodent control which, at a minimum, includes eliminating nearby hiding places (trash, weeds, and debris), trapping and baiting rats and mice on a regular basis.
- i. Farm animals shall be fed and watered on a daily basis in regularly checked and cleaned containers.
- j. The process of weeding out inferior animals (culling), managing mortality (death), and eliminate unwanted animals shall be done through an animal care program involving euthanasia.
 - i. All slaughtering activities shall be done in an enclosed area.

- ii. All wash water and slaughter by-products shall be captured and disposed of as waste.
- iii. Owners should bag and dispose of dead animals by use of an off-site disposal service.

Commentary: On-site weeding (culling) and slaughter shall be limited to farm animals raised within the parcel, not animals from other locations.

This sample ordinance does not regulate most aspects of slaughter (for human consumption) because there are already laws on the books covering that topic:

- United States Department of Agriculture Food Safety and Inspection Service, USDA sanitation inspections,
- Michigan Department of Agriculture and Rural Development license.
- Humane Slaughter of Livestock Act, MCL 287.551 et seq.
- American Veterinary Medical Association Guidelines for the Euthanasia of Animals: 2013 edition.

[End of commentary]

- k. On-site weeding (culling) and slaughter shall be limited to farm animals raised within the parcel, not animals from other locations.
- l. Animal and non-compost waste.
 - i. A maximum of [_number_] animal units per one acre of pasture shall be allowed. (As used here “animal unit” is 1,000 pounds of live weight or as defined in *Generally Accepted Agricultural and Management Practices for Site Selection and Odor Control for New and Expanding Livestock Facilities*, Michigan Department of Agriculture & Rural Development.)

Commentary: The minimum parcel size per animal unit is to address animal waste disposal, especially when parcel sizes will be limited to properly support grazing. Other issues can include manure spreading/incorporation methods, odor issues for nearby residences. The actual minimum number of acres will be different for different parts of the state and will depend on grazing crop, grazing style, pasture management. See Appendix B (page 35) for more discussion on parcel and pasture size per animal. [End of commentary]

- ii. Waste management
 - a. Waste materials (feed, manure, and litter) shall be cleaned up every day, or every few days as needed, from coops and outside areas, and disposed of in an environmentally responsible manner. The materials shall be composted using a fully enclosed bin or three sided structure with the opening facing toward the center of the parcel, or bagged and disposed of in the trash. Piling waste materials on the property is not allowed.
 - b. All waste (including, but not limited to pulled weeds, discarded materials from crops, cracked eggs, spoiled feed, spoiled food, other solid waste, manure) shall be scraped and removed from outside areas.
 - c. Odor shall be controlled by, but not limited to, applying lime or wood shavings.
 - d. Daily or at least every three days indoor areas shall be cleaned. Manure and bedding shall be removed.

- e If manure is temporarily kept on the premises, it shall be placed in a covered bin or on a concrete pad and covered. No runoff shall be allowed from the manure pad onto the ground. Removal shall be done by use of solid waste disposal services or in other ways, including but not limited to shipment to a rural-located farm or composting facility, or composting on site shall be done in a compost bin.

2. Poultry:

Commentary: If poultry are not to be allowed anywhere as an agriculture-like land use, then this part should be deleted.

One should consider a different maximum number of poultry allowed based on different parcel sizes, and in different zoning districts. The actual minimum number of acres will be different for different parts of the state and will depend on the soil type(s) and slopes found within the municipality. See Appendix B (page 35) for more discussion on parcel and pasture size per animal. [End of commentary]

- a. Raising poultry is limited to |six| per parcel in residential zoning districts irrespective of section 10XX.E.1.1.(1). of this Ordinance.
- b. No roosters (male adult chickens) may be kept.
- c. Poultry are not allowed in a residence, porch or attached garage.
- d. Poultry shall be confined (including area of free range) to within the parcel.
- e. The coop shall be designed to discourage rodents and wild birds from entering. The facilities should be built to keep dogs, cats and wildlife from gaining entry.
- f. The poultry facility shall be [₅₋₁₀] feet from any property line or the respective setback required in the zoning district for accessory structures, whichever is greater. The poultry facility shall be [₁₀₋₂₀] or more feet from a neighboring occupied structure.
- g. Sale of poultry products shall not be allowed in residential zoning districts.
- h. An Agriculture-like operation shall annually report its continued existence to the zoning administrator for purposes of reducing impact and spread of a disease through prompt identification of poultry locations. The zoning administrator shall maintain a list of all Agriculture-like operations allowing for a quicker response to a disease outbreak.
- i. Agriculture-like operations shall not be located within four miles of an existing Agricultural commercial poultry operation.

Commentary: The four mile isolation from agricultural commercial operations is for the protection of the commercial poultry operation from spread of disease (e.g., avian influenza) and biosecurity where a backyard flock is the source in a disease event.

This section on poultry is mainly based on recommendations from Michigan State University Extension Bulletin E-3136 *Suggestions for Ordinances Allowing Backyard Poultry*, Karcher, Wylie, Fulton; (October 2010). [End of commentary]

- j. Minimum space and indoor housing requirements (exclusively for the animal and not located within setbacks; front yard; waterfront yard; dwelling; sand dune with slopes greater than 18 percent; beach contiguous to a lake or stream; wetland; and slopes over 25 percent).

Animal	Hen (eggs)	Broiler (meat)	Turkey
Indoor usable floor space per animal	{1-1.5 square feet} 1 square foot	{1 square feet}	{4.2-5 square feet}
Outdoor usable space (fenced, enclosed) per animal	{2 square feet; or 43.6 square feet if pasture only} 64 square feet	{10.8 square feet}	{65 square feet}
Type of housing	Enclosed barn/coup. Local policy may require certain construction appearance.	Enclosed barn/coup. Local policy may require certain construction appearance.	Enclosed barn/coup. Local policy may require certain construction appearance.
Setback	20 feet [_ or the respective setback required in the zoning district _]	20 feet [_or the respective setback required in the zoning district_].	20 feet [_or the respective setback required in the zoning district_].

Commentary: Concerning the outdoor usable space for egg-laying chickens, 2 square feet per hen is the free range estimate, which is described as birds having indoor space and access to outdoor paddocks where it is assumed birds are supplemental fed and also derive benefit from indoor space. The 43.6 square feet standard is for pasture raised only birds, meaning they are expected to survive on pasture as their principal housing and to forage for food with minimum supplementation. [End of commentary]

3. Small farm animal

Commentary: If small farm animal are not to be allowed anywhere as an “agriculture-like” land use, then this part should be deleted.

In this sample zoning “small farm animal” includes goat, pig, sheep, and rabbit. When drafting a proposed zoning amendment from this sample one should include a clear definition of what a “small farm animal” includes and does not include. If it includes additional animals, then standards for those should be added to the table in subsection 3.i.

Another way to define “small farm animal” is by size (weight). Small ruminants are defined here as sheep and goats. For example females of the vast majority of sheep breeds are less than 250 pounds and with female goats less than 200 pounds. Mature size of males of both species are approximately 30% larger.

The actual minimum parcel size, and number of animals per acre of pasture should be based on the need for setbacks (of pasture, livestock housing, manure storage, etc.) from adjacent property. The actual minimum number of acres will be different for different parts of the state and will depend on the soil type(s) and slopes found within the municipality. See Appendix B (page 46) for more discussion on parcel and pasture size per animal. Setbacks might range from 50 to 100 feet for fences, shelters and manure storage if using the water protection standards also included in this sample (page 17-18).

The density in §10XX.E.3.b. provides three options, with the smallest number being used. But the numbers here are “placeholders” likely modified before this sample language is adopted. Another way to define animal unit is the mass of animal that consumes 30 pounds of feed dry matter per day. Using this definition, in the upper Midwest, typical pastures can support approximately one animal unit per acre for grazing. There are pastures in the upper Midwest that can support more than 1 animal unit per acre during the growing season whereas others would require that animals receive supplemental feed during this period. Nearly all animals that graze need supplement feed during winter even at low stocking rates.

Generally the sex of animals is not an issue for sheep but commonly is for goats and as male goats have a very distinctive musky smell. Neutering is nearly always suggested for all male goats in urban setting, if they are going to be allowed.

Mass storage of manure/compost storage is a consideration. One approach could be to scale it to animal units allowed. Example: X cubic yards of manure per animal unit can be stored at any one time.

The incidence of zoonotic diseases in small ruminants is generally fairly low however they are important to note and be aware of. Prominent small ruminant zoonotic diseases in the United States include contagious ecthyma "soremouth" and Q fever (caused by *Coxiella burnetii*).

Not covered in this sample ordinance are additional permit considerations, or exceptions or special uses for scaling up of production to larger operations, or very small activities such as FFA (formerly known as Future Farmers of America) 4-H animal youth projects. Both might be appropriate to consider including in the adopted ordinance.

Finally, another consideration for the local government is if the animal control officers (at the municipal level or the county, whichever has jurisdiction) should be trained in handling small

ruminants. Also does the animal control shelter have separate containment facilities away from canines?

Source: Richard Ehrhardt Ph.D., Small Ruminant Specialist, MSU. [End of commentary]

- a. Minimum parcel size shall be [_number_] square feet.
- b. Raising small farm animals shall be limited to:
 - i. [_number_] animals, or
 - ii. 1,000 pounds of bodyweight per acre ,
whichever is the smaller number.
- c. Setbacks for animal shelters, pasture, or confined containment areas shall be 50 feet from parcel boundary or the respective setback required in the zoning district, whichever is greater.
- d. No male goats may be kept.
- e. Small farm animals are not allowed in a residence, porch or attached garage.
- f. Small farm animals shall be confined in a barn, pasture, confined containment areas. The facilities should be built to keep dogs, cats and wildlife from gaining entry.
- g. The barn shall be designed to discourage rodents and wild birds from entering.
- h. Sale of farm animals, farm animal services, and farm animal products shall not be allowed in residential zoning districts.

- i. Minimum space and indoor housing requirements (exclusively for the animal and not located within setbacks; front yard; waterfront yard; dwelling; sand dune with slopes greater than 18 percent; beach contiguous to a lake or stream; wetland; and slopes over 25 percent).

Animal	Goat	Pig	Sheep	Rabbit
Indoor usable floor space per animal	{Doe and kid: 18 square feet. Buck: 40 square feet.}	{Market pig: 9.1 square feet (market weight ~264 pounds. Sow: 35 square feet (sow with litter); 16 square feet (5-20 sows per pen).}	{Market lamb: 7.5 square feet (45-65 pounds); 9 square feet (65-90 pounds); 11 square feet (91-110 pounds) market weight. Ewe: 14-20 square feet (non-pregnant).}	{Enclosed hutch: 1.5 square feet (small breed); 5.0 square feet (larger breed); Loose floor pen: 6.1 square feet}
Outdoor usable space (fenced, enclosed) per animal	{no specific allowances set} [_insert your number, or leave blank_].	{no specific allowances set} [_insert your number, or leave blank_].	{25-40 square feet}	Pen: {no specific allowances set} [_insert your number, or leave blank_].
Pasture size	[_insert number, or delete_].	[_insert number, or delete_].	[_insert number, or delete_].	n/a
Setback	[_number_] feet or the respective setback required in the zoning district, whichever is greater.	[_number_] feet or the respective setback required in the zoning district, whichever is greater.	[_number_] feet or the respective setback required in the zoning district, whichever is greater.	

- j. Type of housing: Should follow GAAMPs.

- k. Fencing: [_insert type of fence here_].

Commentary: Electric fence is mentioned in GAAMPs, but local policy may result in a specific fencing requirement.

Type of housing: Could be redundant with section 10XX.B. of this ordinance, so this could be deleted or local policy may require certain construction appearance)

Outdoor usable space is different than a pasture. Recommended amount of pasture is determined by use of Appendix B (page 46).

Other animals to consider: Veal, Mink, and Fox. [End of commentary]

4. Large farm animals.

Commentary: If large farm animals are not to be allowed anywhere as a agriculture-like land use, then this part should be deleted.

A community may want to give considerable thought before allowing large farm animals in urban settings. While it may be appropriate in some locations, it may not be in others. The *Urban Livestock Technical Workgroup Report* does not contemplate large farm animals in an urban setting. This should be done with neighborhood involvement.

There are a number of further considerations with large animals in urban settings:

1. A municipality may wish to indicate which animals are allowed (horses, cattle, pigs), not bison. Or large animals may not appropriate for an urban setting. (In this sample zoning “large farm animal” includes horse and cow. When drafting a proposed zoning amendment from this sample one should include a clear definition of what a “large farm animal” includes and does not include. If it includes additional animals, then standards for those should be added to the table in subsection 3.h. Another way to define “large farm animal” is by size (weight).)

2. If allowed section 10XX.B. of this sample ordinance requires following GAAMPs for agriculture-like operations. Specifically the Care of Animals GAAMPs which includes “feeding and watering daily” as well as many other areas of care that owners should be following.

3. The actual minimum parcel size and density, or number of animals per acre of pasture: The actual minimum number of acres will be different for different parts of the state and will depend on the soil type(s) and slopes found within the municipality. See Appendix B (page 46) for more discussion on parcel and pasture size per animal. Setbacks might range from 50 to 100 feet for fences, shelters and manure storage if using the water protection standards also included in this sample (page 17-18).

The density in §10XX.E.4.b. provides three options, with the smallest number being used. But the numbers here are “placeholders” likely modified before this sample language is adopted. Another way to define animal unit is the mass of animal that consumes 30 pounds of feed dry matter per day. Using this definition, in the upper Midwest, typical pastures can support approximately one animal unit per acre for grazing and associated manure (source of nitrogen). Considering phosphorous from manure a pasture should be about 2.5 acres per animal. This 30 pounds of feed is a fairly “typical” stocking rate for productive land in the Midwest. There are pastures in the Midwest that can support this stocking density easily whereas others would require some supplemental feed. Nearly all animals that graze need supplement feed during winter even at low stocking rates.

See also some of the issues in the sidebar for small animals.

Source: Stan Moore, MSU Extension Dairy & Human Resource Senior Educator, moorest@anr.msu.edu [End of commentary]

- a. Minimum parcel size shall be [_number_] square feet.
- b. Raising large farm animals shall be limited to:
 - i. [_number_] farm animals, or
 - ii. 1,000 pounds of body weight per acre,

whichever is the smaller number.

- c. Setbacks for farm animal shelters, pasture, or confined containment areas shall be 50 feet from parcel boundary or the respective setback required in the zoning district, whichever is greater.
- d. No sexually intact male farm animals may be kept.
- e. Large farm animals are not allowed in a residence, porch or attached garage.
- f. Large farm animals shall be confined in a barn, pasture, or confined containment areas. The facilities should be built to keep dogs, cats and wildlife from gaining entry.
- g. Sale of farm animals, farm animal services, and farm animal products shall not be allowed in residential zoning districts.
- h. Minimum space and housing requirements (exclusively for the animal and not located within setbacks; front yard; waterfront yard; dwelling; sand dune with slopes greater than 18 percent; beach contiguous to a lake or stream; wetland; and slopes over 25 percent).

Animal	Horse	Beef Cattle	Dairy Cattle
Indoor usable floor space per animal	No specific size recommended (this row could be deleted).	No specific size recommended (this row could be deleted).	No specific size recommended (this row could be deleted).
Pasture size	[_insert number, or delete_].	[_insert number, or delete_].	[_insert number, or delete_].
Setback	[_number_] feet or the respective setback required in the zoning district, whichever is greater.	[_number_] feet or the respective setback required in the zoning district, whichever is greater.	[_number_] feet or the respective setback required in the zoning district, whichever is greater.

- i. Type of housing: Shall follow GAAMPs.
- j. Fencing: [_insert type of fence here_].

Commentary: Recommended amount of pasture is determined Recommended amount of pasture is determined by use of Appendix B (page 35).

Type of housing: could be redundant with section 10XX.B. of this ordinance, so this could be deleted or local policy may require certain construction appearance.

Other animals to consider: Veal, Bison, Cervidae, Camelids. [End of commentary]

F. Aquaculture:

Commentary: If aquaculture is not to be allowed anywhere as an agriculture-like land use, then this part should be deleted.

The option to regulate indoor or outdoor aquaculture (fish farms) and/or “processing” is something that may be included or left out of this amended section of the zoning ordinance. It may be more appropriate to add indoor aquaculture as a permitted or special use in a manufacturing (or other) zoning district.

Aquaculture is defined as “agriculture” in the Michigan Aquaculture Development Act (MCL 286.871 *et seq.*). That act specifies species of fish, registration with MDARD, permit application process, and inspections. Water from such operations is a point source discharge and regulated by Michigan Department of Environmental Quality (DEQ). National Pollutant Discharge Elimination System (NPDES) permits are required for 20,000 pounds per year cold water fish and 100,000 pounds cool and warm water fish. There is no need to duplicate these regulation systems in zoning (and in some instances zoning is preempted from doing so).

There is allot of interest in urban aquaponics but economics is highly questionable especially in Michigan’s climate. As a result most urban aquaponics are small operations.

The construction code, not zoning, controls structural integrity. Construction code permits are issued after the zoning permit is issued. [End of commentary]

1. [_INSERT REGULATIONS HERE_]
2. A zoning permit shall be issued with the condition there is a finding by the building inspector that the structure upon which the farming takes place meets construction code for the intended use.

G. Farm Market

Commentary: If farm market are not to be allowed anywhere as a agriculture-like land use, then this part should be deleted.

The topics listed here, are generally what the Generally Accepted Agricultural and Management Practices for Farm Markets delegate back to the local government to regulate. Communities should consider regulations for farm markets consistent with regulations already in the zoning ordinance for similar land uses.

The GAAMPs specifies that parking may be on vegetative, ground, pavement, or other suitable material – preempting different local parking lot requirements.

Other delegations back to local jurisdiction, or topics not intended to be covered in the Farm Market GAAMPs can be found in the table “On Farm Activity typically regulated by:” in the GAAMPs (breweries, bonfires, camping, carnival rides, concerts, corn mazes, distilleries, festivals, fishing ponds, haunted barns/trails, mud runs, play-scapes, riding stables, social events winery/hard cider).

There is an unsettled legal question which is if GAAMPs can delegate back to local government regulatory authority which has been preempted in state statute (MCL286.474(6)). [End of commentary]

- a. Building setbacks: same as required in the respective zoning district.
- b. Parking: [_INSERT REGULATIONS OR CROSS REFERENCE TO REGULATIONS HERE_]
- c. Driveway: [_INSERT REGULATIONS OR CROSS REFERENCE TO REGULATIONS HERE_]
- d. Signs: [_INSERT REGULATIONS OR CROSS REFERENCE TO REGULATIONS HERE_]

4. The Ordinance shall be amended to add Section 80XX [Article on nonconformities], as follows, to wit;

80XX. Pre-existing Agricultural Operations

- A. An agriculture operation that was present prior to the adoption of this section of this Ordinance and does not conform to this Ordinance for agriculture shall be considered a nonconforming use for the purposes of scale and type of agriculture and is subject to the following provisions:
 - 1. Scale shall be measured by the total square footage of the agricultural operation, including the square footage of structures.
 - 2. Type is defined by the variety of crop(s) produced.
- B. Nonconforming agricultural operations are subject to Article 8001. et seq., of this Ordinance
- C. Any change in scale or type beyond what is allowed in the nonconforming provisions of this Ordinance will cause the nonconforming agricultural operation to lose its nonconforming status which will require compliance with this ordinance.

Commentary: This section is only needed in a municipality with over 100,000 population that is adopting this sample zoning as its “urban agriculture” zoning amendment pursuant to an introductory paragraph in most GAAMPs:

“This GAAMPs does not apply in municipalities with a population of 100,000 or more in which a zoning ordinance has been enacted to allow for agriculture provided that the ordinance designates existing agricultural operations present prior to the [amendatory] ordinance’s adoption as legal non-conforming uses as identified by the Right to Farm Act for purposes of scale and type of agricultural use.” (Brackets added)

There is an unsettled legal question as to whether or not GAAMPs can delegate back to local government regulatory authority that has been preempted in state statute (MCL286.474(6)).

A combination of requirements from the RTFA and Michigan Zoning Enabling Act allow a nonconforming farm, agriculture, to continue: be completed, reconstructed, extended, and substituted. It also means a farm can change its operation (type of crop, product, processing).. Section 80XX.A. and B. provide the starting point for determining extent of reconstruction, exception, and substitution, not a prohibition of the same. [End of commentary]

5. The Ordinance shall be amended to add Section 8404 [listing of land uses which are exempt from needing a zoning permit or review , **as follows, to wit;**

- A. **Gardens** [consider the option to also exempt from needing a permit, or not, small (specify the size) structures or a greenhouse in a garden. However larger structures such as a hoophouse or large greenhouse, and other similar structures could have significant impacts (fan noise, lights,) on adjoining properties].

6. The Ordinance shall be amended to add to respective land use districts the land uses Agriculture and agriculture-like land uses as permitted or special uses as specified here [Pick and choose which of these for which zoning district(s)]:

- A. Agriculture
- B. Agriculture-like crops
- C. Agriculture-like community garden, market garden
- D. Agriculture-like bees
- E. Agriculture-like poultry
- F. Agriculture-like small farm animal
- G. Agriculture-like large farm animal
- H. Agriculture-like aquaculture
- I. Agriculture-like farm market

[list zoning districts here]

Commentary: It is still unsettled law if a local unit of government can require “Agriculture” to only be in certain zoning districts.

There are district, circuit, unpublished appeals court cases, and legal scholars that suggest local government cannot. The Michigan Department of Agriculture and Rural Development (MDARD) has previously suggested a local government can restrict Agriculture to certain zoning districts. The assumption made in preparing this sample ordinance is that such segregation can take place. But it is possible that is not the case. This should be discussed with an attorney who is experienced in municipal law (planning, and zoning) before adopting an ordinance on this topic.

Assuming local government can distinguish where “Agriculture” can and cannot take place, the appropriate zoning districts should be added to the sample language (at the left) after a careful master planning process. Assuming local government cannot distinguish where “Agriculture” can and cannot take place, “Agriculture” and “Agriculture-Like” should be permitted uses in all zoning districts in the ordinance and all districts should be listed in the sample language, to the left. Arguably, “Agriculture-Like” can be regulated, but treating this activity differently may be a violation of equal protection.

What is clear, is if “Agriculture” is allowed, the zoning ordinance cannot allow certain types of farms and not others. Once Agriculture is allowed, all forms of “Agriculture” shall be permitted. (There may be three exceptions to this: (1) the 100,000 plus population municipality found at the beginning of each GAAMPs, (2) category 4 sites in the *Site Selection GAAMPs*, or (3) submitting the proposed zoning ordinance to the Commission on Agriculture for approval prior to adoption. Under these exceptions one can select certain types of “Agriculture.” One can always select certain types of “Agriculture-like” land uses.) [End of commentary]

7. CONFLICTING ORDINANCES: All other ordinances and parts of ordinances, or amendments thereto, of Anytown Municipality in conflict with the provisions of this ordinance are hereby repealed.

8. RECODIFICATION: That the Ordinance is hereby amended to recodify the numbering of articles and sections to conform to a standard or model codification scheme established by the Ordinance where articles are numbered within groups of ten to associate together similar articles on similar topics, and sections are numbered sequentially with the first two digits being the article number and the next two digits being the sequential section number.

9. EFFECTIVE DATE: This ordinance amendment shall take effect on [_ date _], upon publication in the [_ name of newspaper _].

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Appendix A – Other Resources List

The following are resources used in preparing this material and additional resources that might be used to prepare zoning to accommodate urban agriculture, agriculture in category 4 sites, in communities of over 100,000 population, and agriculture-like land uses.

When using ordinance material from other states, keep in mind it was written to comply with that other state's planning and zoning legislation – not the Michigan Planning Enabling Act or the Michigan Zoning Enabling Act. Thus there is a need to heavily review and edit the ordinance for use in Michigan. Also that review must be done to make sure the other state ordinance does not run afoul of substantive due process. Substantive due process in Michigan is different than some other states (for example aesthetics is not a primary public purpose for health, safety, and welfare but is in some other states).

As communities are working on this, other good ideas may materialize. If you have other sources, or example that should be shared please send them the author/editor of this *Land Use Series* flyer.

General overview:

- Bareth, Brian; "Urban Agriculture as an Emergent Land Use: Case Studies of Municipal Responsiveness," *Zoning Practice*; American Planning Association, August 2014 - Issue Number 8.
- Change Lab Solutions in California's resources on sample zoning ordinances (web site): <http://changelabsolutions.org/healthy-planning>. (Samina Raja, PhD, Associate Professor and PhD Program Director, Department of Urban and Regional Planning, School of Architecture and Planning, University at Buffalo, The State University of New York)
- *Food Systems, Urban Agriculture*; Web page; University of Missouri Extension. Searchable database: <http://extension.missouri.edu/foodsystems/urbanagriculture.aspx>. (Mary Hendrickson, Ph.D., Assistant Professor, Department of Rural Sociology, Advisor Chair - Sustainable Agriculture College of Agriculture, Food and Natural Resources, University of Missouri)
- Hodgson, Kimberley, Marcia Caton Campbell, Martin Bailkey; *Urban Agriculture* (PAS 563); American Planning Association Planning Advisory Service, 2011. ISBN: 978-1-932364-91-0. (https://www.planning.org/store/product/?ProductCode=BOOK_P563)
- Goldstein, Mindy, and Jennifer Bellis, Sarah Morse, Amelia Myers, and Elizabeth Ura; *Urban Agriculture; A Sixteen City Survey of Urban Agriculture Practices Across the County*; Emory Law, Turner Environmental Law Clinic; June 2011. http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/pdf/projects/FPN/Urban_Community_Planning/URBAN_AGRICULTURE_A_SIXTEENCITY_SURVEY_OF_URBAN_AGRICULTURE_PRACTICES_ACROSS_THE_COUNTRY.pdf. (John Fisk Director, <jfisk@winrock.org>, Wallace Center at Winrock International, Arlington, VA| www.winrock.org www.wallacecenter.org)
- Growing Food Connections (web site) Resources policy database: <http://growingfoodconnections.org/tools-resources/policy-database/> (Affiliated with American Planning Association, university at Buffalo The State University of New York, The Ohio State University John Glenn School of Public Affairs, and American Farmland Trust.)
- Koski, Hannah; *The Guide to Urban Farming in New York State*; Cornell University; December 2012. Document: http://nebeginningfarmers.org/files/2013/01/GuidetoUrbanFarminginNYS_Revised2.12.13-2jpbts7.pdf. Web page: <http://www.nebeginningfarmers.org/resources/guides/urban-farming/>.

- Leib, Emily Broad (editor); “Good Laws, Good Food: Putting Local Food Policy to Work for Our Communities,” *Harvard Food Law and Policy Clinic*. July 2012.
http://www.law.harvard.edu/academics/clinical/lsc/documents/FINAL_LOCAL_TOOLKIT2.pdf
(Christie Balch, Executive Director, Crossroads Community Food Network,
<http://www.crossroadscommunityfoodnetwork.org/>
<cbalch@crossroadscommunityfoodnetwork.org>)
- Levenston, Michael; *City Farmer News*; Alternative Farming Systems Information Center (blog):
<http://www.cityfarmer.info/category/policy/>, and <http://www.cityfarmer.info/category/united-states/> (Stephanie Ritchie; <Stephanie.Ritchie@ars.usda.gov> Alternative Farming Systems Information Center, National Agricultural Library, USDA)
- Lucas, Sarah; Patty Cantrell, Kathryn Colasanti, Laura Goddeeris, Matt McCauley; *Food Innovation Districts, An Economic Gardening Tool*; Michigan State University Urban Planning Practicum 2012. Northwest Michigan Council of Governments; March 2013.
<http://www.networksnorthwest.org/planning/planning-policy/food-systems-and-food-innovation-districts/>
- Matts, Colleen; *Marketing Michigan Products, A step-by-step guide*; Michigan State University Center for Regional Food Systems, Michigan Farm to School, and C.S. Mott Group for Sustainable Food Systems; February 1, 2010: <http://foodsystems.msu.edu/uploads/files/marketing-mi-products.pdf>
(found at web page <http://foodsystems.msu.edu/resources/marketing-mi-products>).
- Michigan Association of Planning Michigan Community and Regional Food Systems Planning Policy
http://www.planningmi.org/downloads/map_food_systems_planning_policyboard_adopted_version_622014.pdf
- Michigan Good Food Charter; <http://www.michiganfood.org/uploads/files/Charter.pdf>, found at web page <http://www.michiganfood.org/>
- Michigan Good Food Fund, a public-private partnership loan and grant fund to provide financing and business assistance to good food enterprises that increase access to healthy food and spark economic development and job creation: <http://www.migoodfoodfund.org/>
- National Good Food Network; <http://www.ngfn.org/>
- Neuner, Kailee and Sylvia Kelly, Samina Raja; *Planning to Eat? Innovative Local Government Plans and Policies to Build Healthy Food Systems in the United States*; Food Systems Planning and healthy Communities Lab, university at Buffalo, The State University of New York. September 2011.
<http://foodsystemsplanning.ap.buffalo.edu/wp-content/uploads/2012/08/planningtoeat5.pdf>.
(Samina Raja, PhD, Associate Professor and PhD Program Director, Department of Urban and Regional Planning, School of Architecture and Planning, University at Buffalo, The State University of New York)
- Norris, Patricia, Gary Taylor and Mark Wyckoff; “When Urban Agriculture Meets Michigan’s Right To Farm Act: The Big’s in the Parlor”; *Michigan State Law Review*; 2011:2 Mich St. L. Rev. 365).
<http://www.msulawreview.org/wp-content/uploads/2012/10/2011-2-Norris.pdf>
- Petters, Kathryn A.; “Current and Emerging Issues in the New Urban Agriculture: a Case Study,” *Journal of Food Law & Policy*; 2011; Vol 7., p. 297. <cassiepeters221@gmail.com>
- Sanders, Beth MPH and Annie Shattuck; “Cutting Through the Red Tape: A Resource Guide for Local Food Policy Practitioners & Organizers” *Policy Brief No. 19*, Food First Books; 2011. (Oakland Food Policy Council & Institute for Food and Development Policy/Food First: www.foodfirst.org):
<http://foodfirst.org/wp-content/uploads/2013/12/PB19-Cutting Through the Red Tape.pdf>.
(Christie Balch, Executive Director, Crossroads Community Food Network,

<http://www.crossroadscommunityfoodnetwork.org/>
<cbalch@crossroadscommunityfoodnetwork.org>

- Taylor, Gary Esq.
 - Gary Taylor; associate professor and extension specialist, Department of Community and Regional Planning; and Stephen Lauer, graduate student, Department of Community and Regional Planning, with support from the Leopold Center for Sustainable Agriculture, Iowa State University; *Engaging Community Planners and Local Elected Officials with Local Food Systems; Producers to Integrate Local Food Systems into Community Plans and Policies; Introduction and Overview*. 2011 bulletin 1 of 4. <http://blogs.extension.iastate.edu/planningBLUZ/files/2012/01/SP415A.pdf>
 - Gary Taylor; Alan Vandehaar, state specialist, Extension Community and Economic Development; and Stephen Lauer, graduate student, Iowa State University; *Engaging Community Planners and Local Elected Officials with Local Food Systems Producers to Integrate Local Food Systems into Community Plans and Policies; The Intersection of Local Food Systems and the Agricultural Exemption to Iowa County Zoning*. 2011 bulletin 2 of 4. <http://blogs.extension.iastate.edu/planningBLUZ/files/2012/01/SP415B.pdf>
 - Gary Taylor; Alan Vandehaar; and Stephen Lauer, Iowa State University. *Engaging Community Planners and Local Elected Officials with Local Food Systems Producers to Integrate Local Food Systems into Community Plans and Policies Smart growth and local food systems*. 2011 bulletin 3 of 4. <http://blogs.extension.iastate.edu/planningBLUZ/files/2012/01/SP415C.pdf>
 - Gary Taylor and Stephen Lauer, Iowa State University; *Engaging Community Planners and Local Elected Officials with Local Food Systems Producers to Integrate Local Food Systems into Community Plans and Policies Local Food Systems and Economic Development*. 2011 bulletin 4 of 4. <http://blogs.extension.iastate.edu/planningBLUZ/files/2012/01/SP415D.pdf>
 - Gary Taylor, associate professor and extension specialist, Department of Community and Regional Planning; Andrea Vaage, Master's student in Community and Regional Planning and Sustainable Agriculture at Iowa State University and Extension Research Assistant in the Department of Community and Regional Planning. *Municipal Zoning for Local Foods in Iowa: A Guidebook for Reducing Local Regulatory Barriers to Local Foods*. Leopold Center, Iowa State University Extension and Outreach. <http://blogs.extension.iastate.edu/planningBLUZ/files/2012/01/MUNICIPAL-ZONING-FOR-LOCAL-FOODS-in-IA.pdf>
- United States Department of Agriculture; Urban Agriculture Tool Kit; February 2016; <http://www.usda.gov/documents/urban-agriculture-toolkit.pdf>.
- United States Department of Agriculture; Urban Agriculture web site: <http://www.usda.gov/wps/portal/usda/knownyourfarmer?navid-kyf-urban-agric>.
- *Urban Livestock Workgroup Recommendations to Director Clover-Adams and Senator Hune*, The Urban Livestock Workgroup, Michigan Department of Agriculture and Rural Development, March 15, 2015.
- *Urban Livestock Technical Workgroup Report*, The Urban Livestock Technical Workgroup, Michigan Department of Agriculture and Rural Development, March 15, 2015 (An appendix to *Urban Livestock Workgroup Recommendations to Director Clover-Adams and Senator Hune*).
- UrbanAgLaw.org, Sustainable Economic Law Center; Oakland Calif.: [http://www.urbanaglaw.org/animals-and-livestock/#What are some cities doing](http://www.urbanaglaw.org/animals-and-livestock/#What%20are%20some%20cities%20doing). (Michaela

Oldfield, J.D., <tarrmich@anr.msu.edu>, Ph.D. Candidate, Dept. of Community Sustainability, Michigan State University)

- Wooten, Heather MCP and Amy Ackerman JD; Seeding the City: *Land Use Policies to Promote Urban Agriculture*; National Policy & Legal Analysis Network to Prevent Childhood Obesity and Change Lab Solutions; October 2011; (policy and sample zoning): <http://changelabsolutions.org/publications/seeding-city>. (Amy S. Ackerman, Esq., Law Office of Amy S. Ackerman, Consulting Attorney to ChangeLab Solutions and NPLAN <amy.s.ackerman@gmail.com>)

Soils

- Bugdalski, Lauren and Lawrence D. Lemke and Shawn P. McElmurry; *Spatial Variation of Soil Lead in an Urban Community Garden: Implications for Risk-Based Sampling*; 24 APR 2013, DOI: 10.1111/risa.12053; <http://onlinelibrary.wiley.com/doi/10.1111/risa.12053/full?campaign=wlytk-41422.4855324074> (and news release about the same: Detecting Lead Hotspots in Urban Gardens Requires Different Sampling Strategies according to Wayne State research: <http://media.wayne.edu/2013/06/05/detecting-lead-hotspots-in-urban-gardens-requires>)
- Gublo, Frank; *The high cost of soil testing for urban agriculture makes financial sustainability questionable*; MSU Extension News; October 5, 2015; http://msue.anr.msu.edu/news/the_high_cost_of_soil_testing_for_urban_agriculture_makes_financial_sustain
- Interstate Technology regulatory Council (ITRC) *Incremental Sampling Methodology* (web site); March 2014; <http://www.itrcweb.org/ism-1/>
- Michigan Department of Agriculture and Rural Development (with assistance from the Michigan Department of Environmental Quality and the Michigan Department of Community Health); *Urban Agriculture in Michigan: Things to consider about soil and water*; http://www.michigan.gov/documents/mdard/Urban_Agriculture_in_Michigan_-_Things_to_consider_about_soil_and_water_452158_7.pdf?20150114151547.
- Michigan Department of Agriculture and Rural Development (with assistance from the Michigan Department of Environmental Quality and the Michigan Department of Community Health); *Working with Soil in Urban Areas*; March 2014; http://michigan.gov/documents/mdard/Working_With_Soil_in_Urban_Areas_452152_7.pdf.
- Web Soil Survey (web-based modern progressive soil survey maps and soil properties tables): <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Storm Sewer, Drain, and Sanitary Sewer Protection:

- Department of Environmental Quality's stormwater page: http://www.michigan.gov/deq/0,4561,7-135-3313_3682_3716---,00.html (Ruth Kline-Robach <kliner@msu.edu>, Institute of Water Research & Department of Community Sustainability(IWR))
- Lansing area communities related to stormwater: http://www.mywatersheds.org/public_education.html (Ruth Kline-Robach <kliner@msu.edu>, Institute of Water Research & Department of Community Sustainability(IWR))
- Michigan Department of Environmental Quality (DEQ) storm water web page for more information on this topic: http://www.michigan.gov/deq/0,4561,7-135-3313_3682_3716---,00.html (Dave Lusch <lusch@msu.edu> and Ruth Kline-Robach <kliner@msu.edu>, Institute of Water Research & Department of Community Sustainability(IWR))

- MCL 324.3101 *et seq.* (Chapter 1 (Part 31-53) of PA 451 of 1994, as amended, being the Point source pollution control chapter of the Natural Resources and Environmental Protection Act. (Dave Lusch <lusch@msu.edu> and Ruth Kline-Robach <kliner@msu.edu>, Institute of Water Research & Department of Community Sustainability(IWR)
- Stormwater regulations in your area, contact your district DEQ staff. Contact information can be found at: http://www.michigan.gov/deq/0,4561,7-135-3313_3682_3716-24454--,00.html (Dave Lusch <lusch@msu.edu> and Ruth Kline-Robach <kliner@msu.edu>, Institute of Water Research & Department of Community Sustainability(IWR)

Compost:

- *Composting on Michigan Farms*; MSU Extension Bulletin E-2715. http://shop.msu.edu/product_p/bulletin-e2715.htm
- Robb, G. William and M. Charles Gould; *Composting Livestock Manure*; (web site); http://www.animalagteam.msu.edu/animalagteam/composting_livestock_manure

Bees:

- *Bee Lab* web page: “Ordinances regarding bees.” University of Minnesota. Dr. Marla Spivak, MacArthur Fellow, Distinguished McKnight Professor, Extension Entomologist and Gary Reuter, Scientist, a.k.a. Gary-of-all-Trades. University of Minnesota. <http://beelab.umn.edu/Resources/Ordinancesregardingbees/index.htm>
- City of Madison, Wisconsin. <http://www.cityofmadison.com/dpced/bi/obtaining-a-city-of-madison-beekeeping-license/108/> (Michelle Miller <mmmille6@wisc.edu>)
- City of Richmond, Virginia or Virginia Department of Agriculture and Consumer Services (Margaret Merrill, Vermont U, <mmerrill@vt.edu>)
- Fischer, Jim; “Pointers for Extreme Urban Beekeeping;” Appendix G of *The Beekeeper’s Handbook*; Cornell University Press; New York City Beekeeping Association; <http://www.nycbeekeeping.org>.
- Huang, Zachary, *Bee The Best; Passion for Bees, Compassion for Beekeepers* <http://bees.msu.edu/>
- Puget Sound Beekeepers Association web page. “Beekeeping Laws” (Seattle and King County (Washington) areas.) <http://www.pugetsoundbees.org/beekeeping-laws/>
- Smitley, David and Diane Brown, Erwin Elsner, Joy N. Landis, Paula M. Shrewsbury, Daniel A. Herms; *Protecting and enhancing pollinators in urban landscapes for the U.S. North Central Region*; MSU Extension bulletin E3314; April 2016; http://msue.anr.msu.edu/resources/how_to_protect_and_increase_pollinators_in_your_landscape.
- United States Conference of Mayors, Food Policy Task Force: <http://www.usmayors.org/foodpolicy/> (Michelle Miller <mmmille6@wisc.edu>)
- Wooten, Heather MCP and Amy Ackerman JD; *Seeding the City: Land Use Policies to Promote Urban Agriculture*; National Policy & Legal Analysis Network to Prevent Childhood Obesity and Change Lab Solutions; October 2011; (policy and sample zoning): <http://changelabsolutions.org/publications/seeding-city>. (Amy S. Ackerman, Esq., Law Office of Amy S. Ackerman, Consulting Attorney to ChangeLab Solutions and NPLAN <amy.s.ackerman@gmail.com>)

Poultry:

- The American Veterinary Medical Association; *AVMA Guidelines for the Euthanasia of Animals*: 2013 Edition; <https://www.avma.org/kb/policies/documents/euthanasia.pdf>.

- Karcher, Darrin M. and Paul Wylie, R. M. “Mick” Fulton, D.V.M., Ph.D. *Suggestions for Ordinances Allowing Backyard Poultry*. This sample ordinance includes recommendations from Michigan State University Extension Bulletin E-3136. October 2010: <http://lu.msue.msu.edu/pamphlet/Zsp/E3136.pdf>.
- Michigan Department of Agriculture and Rural Development; *2015 Michigan Reportable Animal Diseases List*. http://michigan.gov/documents/mdard/2013_2014_MDARD_AID_Reportable_Animal_Diseases_426614_7.pdf (found at web page http://michigan.gov/mdard/0,4610,7-125-48096_48097---,00.html).
- Seavey, David C., Extension Agricultural Resources Educator; John C. Porter, Extension Dairy Specialist; *Housing and Space Guidelines for Livestock*; University of New Hampshire Cooperative Extension; June 2009. (<http://extension.unh.edu/resources/tag/livestock>)
- Wooten, Heather MCP and Amy Ackerman JD; *Seeding the City: Land Use Policies to Promote Urban Agriculture*; National Policy & Legal Analysis Network to Prevent Childhood Obesity and Change Lab Solutions; October 2011; (policy and sample zoning): <http://changelabsolutions.org/publications/seeding-city>. (Amy S. Ackerman, Esq., Law Office of Amy S. Ackerman, Consulting Attorney to ChangeLab Solutions and NPLAN <amy.s.ackerman@gmail.com>)

Farm Animals (small and large animals):

- The American Veterinary Medical Association; *AVMA Guidelines for the Euthanasia of Animals*: 2013 Edition; <https://www.avma.org/kb/policies/documents/euthanasia.pdf>.
- Butler, W. H. “Welcoming animals back to the city: Navigating the tensions of urban livestock through municipal ordinances.” *Journal of Agriculture, Food Systems, and Community Development*; 2(2), 193-215. (<http://dx.doi.org/10.5304/jafscd.2012.022.003>)
- Levenston, Michael; *City Farmer News*; Livestock; Alternative Farming Systems Information Center, (blog): <http://www.cityfarmer.info/category/livestock/> (Stephanie Ritchie; <Stephanie.Ritchie@ars.usda.gov> Alternative Farming Systems Information Center, National Agricultural Library, USDA)
- McClintok, Nathan, and Esperznza Pallana, Heather Wooten. “Urban livestock ownership, management, and regulation in the United States: An exploratory survey and research agenda.” *Land Use Policy*, 38 (2014) 426-440. (<file:///C:/Users/kschindler/AppData/Local/Microsoft/Windows/Temporary%20Internet%20Files/Content.Outlook/DV79AD0F/dx.doi.org/10.1016/j.landusepol.2013.12.006>)
- Michigan Department of Agriculture and Rural Development; *2015 Michigan Reportable Animal Diseases List*. http://michigan.gov/documents/mdard/2013_2014_MDARD_AID_Reportable_Animal_Diseases_426614_7.pdf (found at web page http://michigan.gov/mdard/0,4610,7-125-48096_48097---,00.html).
- Seavey, David C., Extension Agricultural Resources Educator; John C. Porter, Extension Dairy Specialist; *Housing and Space Guidelines for Livestock*; University of New Hampshire Coop. Extension; June 2009. (<http://extension.unh.edu/resources/tag/livestock>)
- Underwood, Kathryn Lynch, City Planner. *Urban Livestock Ordinances: Six-City Comparison*. Undated draft. City Planning Commission/City Council, Legislative Policy Division, Detroit.
- Underwood, Kathryn Lynch, City Planner. *Urban Livestock Guild: Urban Livestock Guild Draft 1*, City Planning Commission/City Council, Legislative Policy Division, Detroit. (Kathryn Lynch

Underwood, <KathrynL@detroitmi.gov>, City Planner, City Planning Commission/City Council, Legislative Policy Division, Detroit)

- *Zoning Practice* issue number 4 “Practice Urban Livestock” American Planning Association, April 2013: www.planning.org. (Kathryn Lynch Underwood, <KathrynL@detroitmi.gov>, City Planner, City Planning Commission/City Council, Legislative Policy Division, Detroit)

Aquiculture:

- Colyn, Joe and Gary Boersen. *Aquaculture in Michigan Roadmap through Regulation*. Originz, LLC. Summer 2012. Report prepared for the Aquaculture Industry Committee under administration of the Michigan Department of Agriculture and Rural Development (http://www.michigan.gov/mdard/0,4610,7-125-48096_48099_48140-345145--,00.html).

Appendix B – Pasture Carrying Capacities of Michigan

The material presented here is to provide stocking rates – or amount of land per pounds of animal for purpose establishing a minimum amount of land for pasture.

For example, using the data below in this appendix for your part of the state, calculate for the three pasture types (Managed Intensive Grazing, Rotational Grazing, and Continuous or Set Stock Grazing) minimum acreage for 1,000 pounds of animal.

Minimum acres of Pasture plus Dwelling area of 0.34 acres (15,000 square feet) plus area required for Setbacks plus other farm operation space (crop, buildings, market, etc.).

$P + D + S + F = \text{parcel size}$

When regulating livestock in Category 4 sites or in urban agriculture situations the ordinance would use the result, and might read: “The minimum pasture area per 1,000 pounds of animal shall be:

1. [P] for Managed Intensive Grazing,
2. [P] for Rotational Grazing,
3. [P] for Continuous or Set Stock Grazing.”

Or the ordinance might establish a minimum overall parcel size, using the “ $P + D + S + F = \text{parcel size}$ ” formula, above and might read: “The minimum parcel size per 1,000 pounds of animal shall be:

1. [parcel size] for Managed Intensive Grazing,
2. [parcel size] for Rotational Grazing,
3. [parcel size] for Continuous or Set Stock Grazing.”

By Jerry Lindquist,

MSU Extension Grazing Educator

Carrying capacity in its simplest definition is the number of animals that a particular pasture area will support with forage for a specific period of time. It is used to plan and to evaluate pasture grazing.

Forage pasture plant's productivity is highly variable and is dependent upon many factors including: forage plant species and variety make-up; soil type; soil fertility; weather; grazing management style; geographic location; and the type of grazing animal to name a few.

Thus these carrying capacities are highly variable and should only be used as long term estimates that will become more accurate over the course of multiple years.

In this document Michigan is divided into three geographic zones from north to south.

- The Northern most zone is the Upper Peninsula of Michigan.
- Lower Peninsula north of a line from Bay City to Shelby, Michigan.
- Lower Peninsula south of the line from Bay City to Shelby, Michigan.

Differentiation is further made in this document by the grazing styles. The three styles are defined as:

- Managed Intensive Grazing (MIG) - Animals are moved to new pasture cells or paddocks at least every 3rd day. This grazing method assumes a 70% pasture utilization rate.
- Rotational Grazing - Animals are moved to new pasture paddocks or fields within a range of every 4 - 21 days. This grazing method assumes a 50% forage utilization rate.
- Continuous or Set Stock Grazing - Animals are continuously grazed on one pasture or if moved to new pasture, no sooner than every 22 days. This grazing method assumes a 40% forage utilization rate.

The chart is further divided by the type of improvements that have been made to the pasture over time. Those three definitions are:

- Improved Pasture - Pasture that has received improvement additions such as seed, fertilizer, lime or mechanically applied manure in the past 7 years.
- Un-Improved Pasture - Pasture that has received no improvements in the past 7 years.
- Woodland Mixed Pasture - Pasture that has an over-story canopy of trees and herbaceous shrubs across at least 35% of the landscape.

An animal unit (AU) is a 1,000 pounds of animal commonly assumed to be a beef cow and her growing calf.

An animal unit month per acre (AUM/a) is the number of months a 1,000 pound cow with her calf will be sustained on an acre of pasture (26 pounds of dry matter forage intake per head per day).

An acre per animal unit (Acres/AU) is the number of acres that are needed to support an animal unit for the common six month Michigan grazing season.

Upper Peninsula Carrying Capacity

	Improved Pasture	Un-improved pasture	Woodland Mixed Pasture
Managed Intensive Grazing (MIG)	5.8 AUM/a (1.0 acres/AU)	3.6 AUM/a (1.7 acres/AU)	2.0 AUM/a (3.0 acres/AU)
Rotational	4.2 AUM/a (1.4 acres/AU)	2.6 AUM/a (2.3 acres/AU)	1.4 AUM/a (4.3 acres/AU)
Continue	3.3 AUM/a (1.8 acres/AU)	2.1 AUM/a (2.9 acres/AU)	1.1 AUM/a (5.3 acres/AU)

Lower Peninsula north a line from Bay City to Shelby, Michigan, Carrying Capacity

	Improved Pasture	Un-improved pasture	Woodland Mixed Pasture
Managed Intensive Grazing (MIG)	6.5 AUM/a (0.9 acres/AU)	4.0 AUM/a (1.5 acres/AU)	1.9 AUM/a (2.8 acres/AU)
Rotational	4.6 AUM/a (1.3 acres/AU)	3.0 AUM/a (2.1 acres/AU)	1.5 AUM/a (3.9 acres/AU)
Continue	3.7 AUM/a (1.6 acres/AU)	2.3 AUM/a (2.7 acres/AU)	1.2 AUM/a (4.9 acres/AU)

Lower Peninsula south of a line from Bay City to Shelby, Michigan, Carrying Capacity

	Improved Pasture	Un-improved pasture	Woodland Mixed Pasture
Managed Intensive Grazing (MIG)	7.5 AUM/a (0.8 acres/AU)	4.9 AUM/a (1.2 acres/AU)	2.7 AUM/a (2.2 acres/AU)
Rotational	5.4 AUM/a (1.1 acres/AU)	3.5 AUM/a (1.7 acres/AU)	1.9 AUM/a (3.1 acres/AU)
Continue	4.3 AUM/a (1.4 acres/AU)	2.8 AUM/a (2.1 acres/AU)	1.5 AUM/a (3.9 acres/AU)

As an example of how to use these numbers if you have a beef cow herd in which the cows on average weigh 1,400 lbs. per cow you would use a multiplying factor of 1.40 (1,400 lbs. divided by 1,000 lbs. animal unit). If you are located in the Northern Lower Peninsula and you use rotational grazing on an improved pasture you divide the 4.6 AUM/a on the chart by 1.40 and get 3.3 AUM/a. This means that on your pasture under your management style that one acre of pasture will support on average a 1,400 lb. cow and her growing calf for 3.3 months or 99 days.

Or the other way to look at it is the acres per animal unit required for the six month Michigan grazing season. In the same example using the chart number in parenthesis of 1.3 acres/AU and this time multiplying by 1.40 cow actual weight factor we see that it will require 1.82 acres per each cow and her calf to carrying them through the average six month grazing season for your location in Michigan. For a 30 cow herd it will require approximately 55 acres of pastureland.

Animal units can also be adjusted and used for other types of livestock. For sheep the actual weight factor for a grazing ewe and her lambs might be 0.115 if the flock has ewes that on average weigh 115 lbs. per ewe. Using this 0.115 factor the rest of the calculations can be carried out the same way as for the beef cow.

Annual Forage Crops Grazing Carrying Capacity

Many annual crops that are routinely used as a cover crop also have good to excellent forage nutritional qualities for grazing. Because their growing time is relatively short (50-100 days) their yields are highly variable and are dependent upon favorable weather conditions during this period. Thus carrying capacities and yields are provided in variable ranges based on the wide range in yields.

Annual Forage Crops Grazing Carrying Capacity

Annual Crop	Yield Tons of Dry Matter / Acres	Yield Tons of AMU / Acre	Yield Tons of Acres / AU
Grazing Corn	3.0 - 6.0	5.4 - 10.8	0.56 - 1.11
Multi Specie Annual Fall Grazing Mix	2.0 - 5.0	3.6 - 9.0	0.67 - 1.67
Millet, Summer Grown	2.4 - 4.0	4.3 - 7.2	0.83 - 1.39
Oats, Fall Grown	2.0 - 3.5	3.6 - 6.3	0.96 - 1.67
Rape	2.0 - 4.5	3.6 - 8.1	0.74 - 1.67
Radish, Grazing Type	3.0 - 5.0	5.4 - 9.0	0.67 - 1.11
Sorghum Sudan Hybrid	2.0 - 6.0	3.6 - 10.8	0.56 - 1.67
Sudan Grass	3.0 - 5.0	5.4 - 9.0	0.67 - 1.11
Annual Ryegrass / Rape mix	2.5 - 5.5	4.5 - 10.0	0.61 - 1.34

This is not a complete listing of all the different annual crops that can be grazed. It is a comparison of annual forage crops that MSU and some other universities have grown in yield trials. Because many of these annual crops are grown late in the growing season it must be realized that weather events such as snow or ice can cover the crop before it all can be grazed. Thus stocking rates must be adjusted accordingly to utilize the crops full potential before season ending weather hits.

The carrying capacities assume a 70% utilization rate for grazing these annuals.

Sources

Sources used for the comparisons of pasture yields and annual forage crop yields include:

- Pasture Nitrogen Trial at MSU Lake City BioAg Research Station, 2012-2015, Jerry Lindquist, MSU Extension
- Pasture Grass Response to Nitrogen, 2003-2005, Dr. Richard Leep & Tim Dietz, MSU
- Nitrogen on Grass, 1968-1977, Dr. Milo Tesar, MSU
- Forage Rescue Trial, 2003, Dr. Richard Leep, MSU
- Evaluation of Warm Season Grasses and Brassicas on Annual Forage Systems for Lamb Production, 2013, Dr. Richard Ehrhardt, MSU
- Alternative Forage Crops, 2001, Dr. Dan Undersander, University of Wisconsin
- Grazing Standing Corn, 2004-2005 trial, Jerry Lindquist, MSU Extension
- Grazing Multi Specie Annual Forage Crop Mixes, 2014-2015 trial, Jerry Lindquist, MSU Extension

Another approach

An earlier version of this Appendix B included this chart for stocking rates.

Earlier Stocking Rate Chart

Animal Type	Typical Stocking Rates; minimum acres of pasture. Stocking rates are averages for the entire grazing season May – September and are variable	Minimum parcel size	Pasture setback from surface water
Beef Cow (1,3000 pounds) with calf	2.5 to 4.5 acres per cow and calf	See note, below	
Beef Yearling Cattle (600 to 800 pounds)	1.4 to 2.6 acres per head	See note, below	
Goat: doe with kids	0.15 to 0.7 acres per doe and kids	See note, below	
Horse (two years of age and above)	2.7 to 4.8 acres per head	See note, below	
Horse (yearling)	1.9 to 3.5 acres per head	See note, below	
Sheep: ewe with lambs	0.2 to 0.8 acres per ewe and lambs	See note, below	

NOTE: Minimum acres of Pasture plus Dwelling area of 0.34 acres (15,000 square feet) plus area required for Setbacks plus other Farm operation space (crop, buildings, market, etc.).

P + D + S + F = parcel size

Appendix C – Soil testing for urban agriculture

Before anyone launches an urban farm, environmental soil tests should be completed. The high costs of these tests are difficult to repay for the small farmer using produce sales as the source of income.

by Frank Gublo, Michigan State University Extension

While a city offering vacant land to urban farmers for \$100 per acre may seem to be a low and reasonable price, there are hidden costs associated with acquisition and development of land for urban agriculture. Urban agriculture is a high risk, low return venture¹² that needs careful consideration before a launch is undertaken. Purchasing land that needs large investments to bring soil health to acceptable standards can be expensive, leading to failure of the venture. Beginning farmers and others need to understand the hidden costs of developing urban farms, and make appropriate business decisions that lead to production of safe food, and financial success.

When considering a piece of land, soil testing should be the first consideration in determining its capacity and value for farming. In cities such as Detroit, concern has been expressed regarding the levels of lead and other contaminants in the soil, and the effect it has on food safety, if the ground is farmed and the produce is sold commercially. Testing protocols have been reviewed and suggestions have been made to improve the quality of soil testing, in order to clear up public concern regarding produce grown in urban soils. Wayne State University researchers have developed a testing protocol that results in a 95 percent certainty¹³ of detection of lead in urban soils (see page 42 and 50). Additionally other environmental soil tests may be needed, such as cadmium and arsenic, using ITRC protocols which might have a negative effect on health when ingested (see page 42 and 50).

Using the Wayne State University protocol, an individual sample is needed every 242 square feet. On a city lot of 7,500 square feet, 31 individual samples would need to be taken and tested. Soils are not to be mixed because the dilution of a hot spot would occur. For one acre, 180 individual samples would need to be taken and tested.

Environmental soil testing is different than normal agricultural testing and may not be available through the Extension service. Commercial laboratories may have the capacity to conduct the test, and some state universities might be able to conduct the test. Pennsylvania State does offer environmental soil testing¹⁴ for parcels that are, or might be used for urban farming.

Using Pennsylvania State's lab, for lead \$27 per sample: We know that a 7,500 square foot lot needs 31 samples, using Wayne State University's protocol, resulting \$837 per lot. One acre (5.81 lots) would cost \$4,860 for lead testing. Additional testing might also be necessary, given the history of a certain tract of land. Additional costs related to cleanup and mitigation would come into play if the parcel is found to be problematic. The cost of the city lot is much greater than the offering price of \$100 per acre for surplus land.

What are the options for the urban farmer? The principles of sustainable agriculture and general ethics would prohibit looking the other way, and to plant and grow crops without adequate testing. This leaves management choices of proceeding with testing, and then making decisions on how to proceed once the level of contaminants is known. The second option would be to forgo the opportunity to buy an urban

¹² http://msue.anr.msu.edu/news/urban_farms_need_financially_sound_business_models_to_be_truly_sustainable

¹³ <http://media.wayne.edu/2013/06/05/detecting-lead-hotspots-in-urban-gardens-requires>

¹⁴ <http://agsci.psu.edu/aasl/soil-testing/environmental-soil-testing>

lot, due to the high cost of testing. The average cost of farmland in Michigan¹⁵ is estimated from \$3,699 to \$4,646, with residential land at \$7,398 per acre. The urban farmer might consider renting agriculture land outside the city, with average land rents of \$142 per acre for agricultural lands. Additional alternatives such as growing indoors or above ground might be more sustainable option, but not without cost.

If a local government/zoning jurisdiction or farmer is interested in knowing more about urban farm soil testing, for an urban agriculture venture, educators at Michigan State University Extension and innovation counselors at the Michigan State University Product Center¹⁶ can assist potential businesses in the establishment of good practices to improve business effectiveness. For further information and assistance with employee communications please contact your local Michigan State University Extension office.

¹⁵ https://www.msu.edu/-steind/land_2014%20Michigan%20Land%20Values%20&%20Leasing%20Rates.pdf

¹⁶ <http://productcenter.msu.edu/>

Appendix D – Summary of revisions

This Land Use Series is intended to be regularly updated. The first version was prepared April 28, 2015. Changes in subsequent updates include:

- April 28, 2015 initial version.
- June 22, 2015:
 - Added information about Michigan Agricultural Mediation Program.
 - Clarification on acres per animal (pasture) rather than contacting USDA Natural Resources Conservation Service (NRCS).
 - Added confining poultry to the parcel.
 - Added Food Innovation Districts, An Economic Gardening Tool. Marketing Michigan Food Products, and Michigan Good Food Fund to list of resources.
 - Added Web Soil Survey to list of resources.
 - Added “Appendix B– Pasture Stocking Rates.”
 - Added this “Appendix D – Summary of Revisions.”
- March 3, 2016:
 - Added Wayne State University soil testing protocols with increased emphasis on importance of soil testing for lead and other contaminants.
 - Clarified regulation of minimum pasture size and parcel size per animal.
 - Added clarification to water setbacks.
 - Added a set of Iowa State University Extension local foods publications (by Gary Taylor), soil testing research, Michigan Good Food Charter, Michigan Association of Planning food policy, and National Good Food Network to appendix A resources.
 - Replaced “Appendix B - Pasture Stocking Rates” with a more detailed treatment of the subject: “Appendix B - Pasture Carrying Capacities of Michigan.”
 - Added “Appendix C– Soil testing for urban agriculture.”
- September 1, 2016:
 - Added a reference to Protecting and enhancing pollinators in urban landscapes for the U.S. North Central Region.
 - Added further information to the side-bar box on Aquaculture and Christopher Weeks to the list of authors and contributors.
 - Added The Guide to Urban Farming in New York State to Appendix A resources.
 - Added Urban Agriculture Tool Kit and USDA web site to Appendix A resources.
 - Added Protecting and enhancing pollinators in urban landscapes for the U.S. North Central Region to appendix A resources.
 - Added Aquaculture in Michigan Roadmap through Regulation to appendix A resources.
- August 31, 2017: Reformatted into a new layout and design.
- May 13, 2020:
 - Added outdoor usable space free range standard for egg-laying chickens and clarified the difference compared to pasture only systems with new commentary box.
 - Minor corrections to some bulleted lists.