



IMPORTANCE OF INDIANA AGRICULTURE

INTRODUCTION

Tanya Hall, author

Indiana's agriculture industry has a treasured heritage. This industry has simultaneously remained true to its roots and adopted innovative practices to address current challenges and needs. As fewer individuals interact with the daily efforts associated with raising or growing agricultural products, appreciation of its place within the larger Hoosier economy and landscape becomes diminished. Likewise, grasping the breadth and importance of the agriculture industry can seem elusive due to the complexities associated with gathering data on all agricultural enterprises, big and small. Any assessment of the scope of urban agriculture

is mostly anecdotal, as little data exists to fully capture the breadth of activity occurring in urban areas. This introduction to the Food and Agriculture section will provide a big-picture view of Indiana's flourishing agriculture industry – in both rural and urban settings.

INDIANA'S LANDSCAPE: PAST AND PRESENT

In 2017, Indiana had 56,800 farms and 14.7 million acres devoted to agriculture production, comprising 63.1 percent of the state's land (State Agriculture Overview, 2017). While still sizable, between 1925 and 2017, the state saw a 71 percent drop in number of farms and a 26.2 percent drop in acreage (United States Census of Agriculture, 1925). Individuals might not realize that Indiana is one of three states with more than 50 percent of its land (12.9 million acres) classified as prime farmland (Hall, 2010).

As the quantity of farms and farmland downsized, the share of individuals residing on farms dropped and the size of the farm evolved greatly since 1925 (Hall, 2015). As of 2012, 46.7 percent of farms were less than 50 acres, 40.5 percent were between 50 and 500 acres and the remaining 12.8 percent were more than 500 acres. Therefore, in Indiana, large and mid-scale agriculture production exists, yet there has been a tremendous growth since 1925 (19 percentage points) in small farm production (less than 50 acres). The importance of agriculture is not solely relegated to the rural areas of the state, as smaller farms can and do exist in urbanized areas.

Researcher Arthur Nelson (1990) noted that most of the United States’ prime farmland is located within the suburban and exurban counties of metropolitan areas. Thus, land most suitable for agricultural production is often equally desirable for development (Solomon, 1984). Between 1982 and 2012, Indiana saw 563,700 acres converted to developed uses (Farmland Information Center, 2018), which will likely never be reconverted to agricultural uses.

Today, most farms are not engaged in subsistence farming; rather, they produce a few commodities and take all, or a large share, of their output to the market. Therefore, manufacturing and wholesale operations play a large part in adding value to the raw outputs from the farm.* At present, Indiana is experiencing a resurgence of interest in local foods and urban agriculture, with consumers yearning to produce agricultural products, understand food production practices and have a relationship with the farmer. The local foods movement has extended beyond farmers’ markets as restaurants source foods locally, institutions prefer purchasing local foods, communities are growing community gardens and consumers engage in farm tours, community-supported agriculture memberships and support local foods initiatives. Likewise, concerns about the prevalence of Indiana’s more than 200 food deserts, or areas lacking access to healthful whole foods, have increased interest in urban agriculture.

INDIANA AGRICULTURE PRODUCTION AND ITS VALUE

Given Indiana’s landscape, it is no surprise that, according to 2017 rankings, the state was a top 10 producer of 12 commodities (see **Table 1**). This production is possible because of the state’s prolific production ability and livestock-friendly practices. National and international demand for the agricultural products produced in Indiana has driven growth in addition to increased efficiencies in the production process.

TABLE 1: INDIANA’S RANK IN AGRICULTURAL PRODUCTION

Commodity	Rank
*Ducks	1
Eggs produced	2
Spearmint	3
Tomatoes	3
Peppermint	4
Pumpkins	4
Turkeys raised	4
Watermelon	5
Corn for grain	5
Pigs	5
Soybeans	5
Cantaloupe	6

Sources: NASS 2017 State Agriculture Overview; Duck data* from Indiana State Board of Animal Health

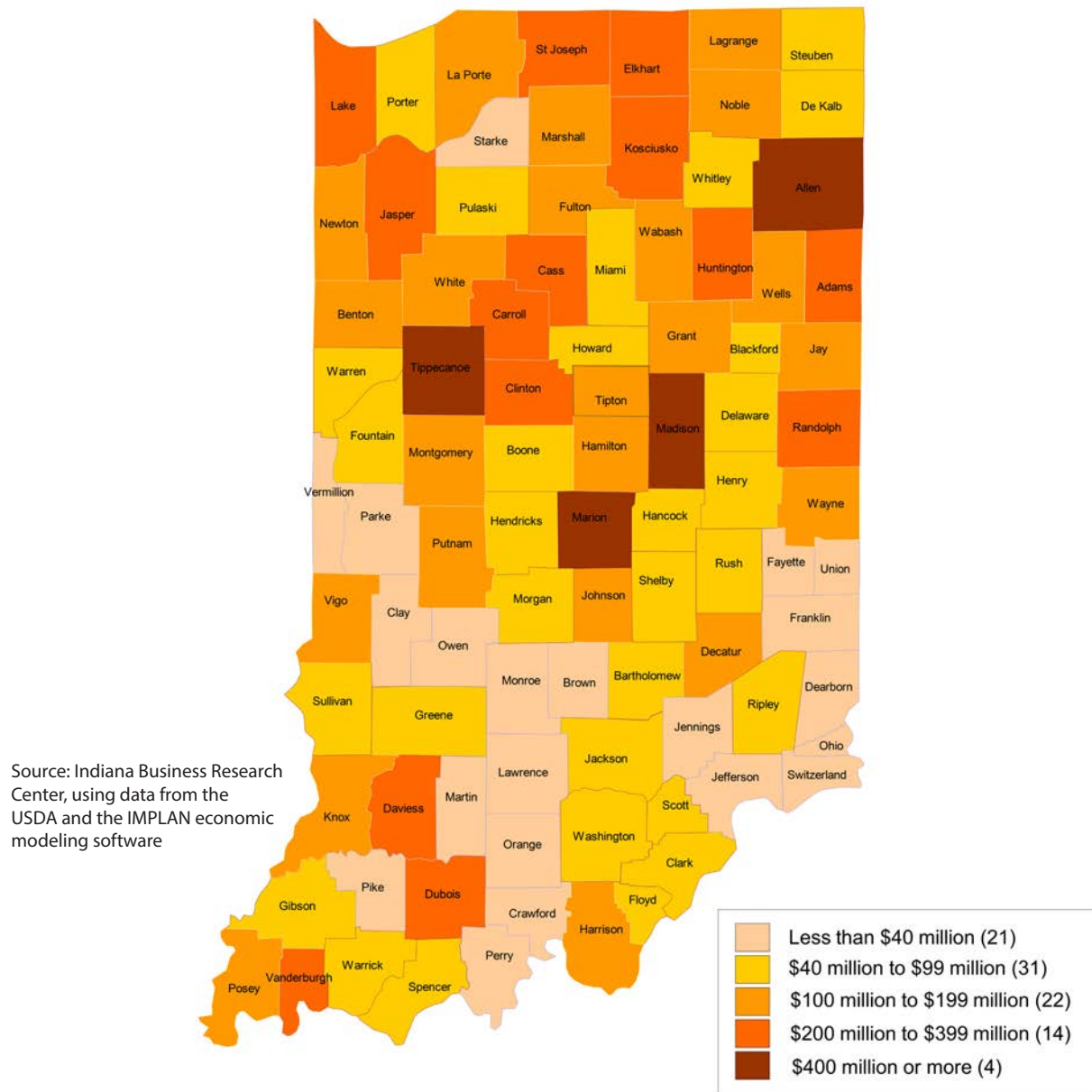
Production of these commodities (and more) led to Indiana farmers receiving \$10.6 billion in cash receipts from farm marketings in 2017. More than one-third of the cash receipts came from animals and products (35.1 percent) with the remainder coming from crops (64.9 percent), namely corn and soybeans (31.5 and 29 percent, respectively). All other crops, vegetables, melons, fruits and nuts comprised 3.6 percent of the cash receipts, but are likely higher as fruit production data is suppressed (NASS, 2018).

ECONOMIC IMPACT OF THE INDIANA AGRICULTURE INDUSTRY

As of 2012, the Indiana agriculture industry's impact on sales was estimated at \$44.1 billion. The value added created by the agriculture industry (GDP) accounts for nearly 5 percent of the state's economy (\$14.9 billion) and every dollar of GDP generated another \$0.88 in economic activity within other industries in Indiana. Despite agricultural production comprising more than 70 percent of the economic impact on sales, it only accounted for half of the total GDP contribution (\$7.44

billion) as the remainder went to agriculture-related manufacturing (IBRC, 2015a). Due to the prevalence of agriculture-related processing and manufacturing activities, often within more urbanized counties' borders, several of Indiana's more urbanized counties made the largest contributions to the agriculture industry. Much of this was driven by grain and soybean processing, causing Marion, Madison, Allen and Tippecanoe counties to have the largest share of total agricultural GDP effect amongst all counties (see **Figure 1**) (IBRC, 2015b).

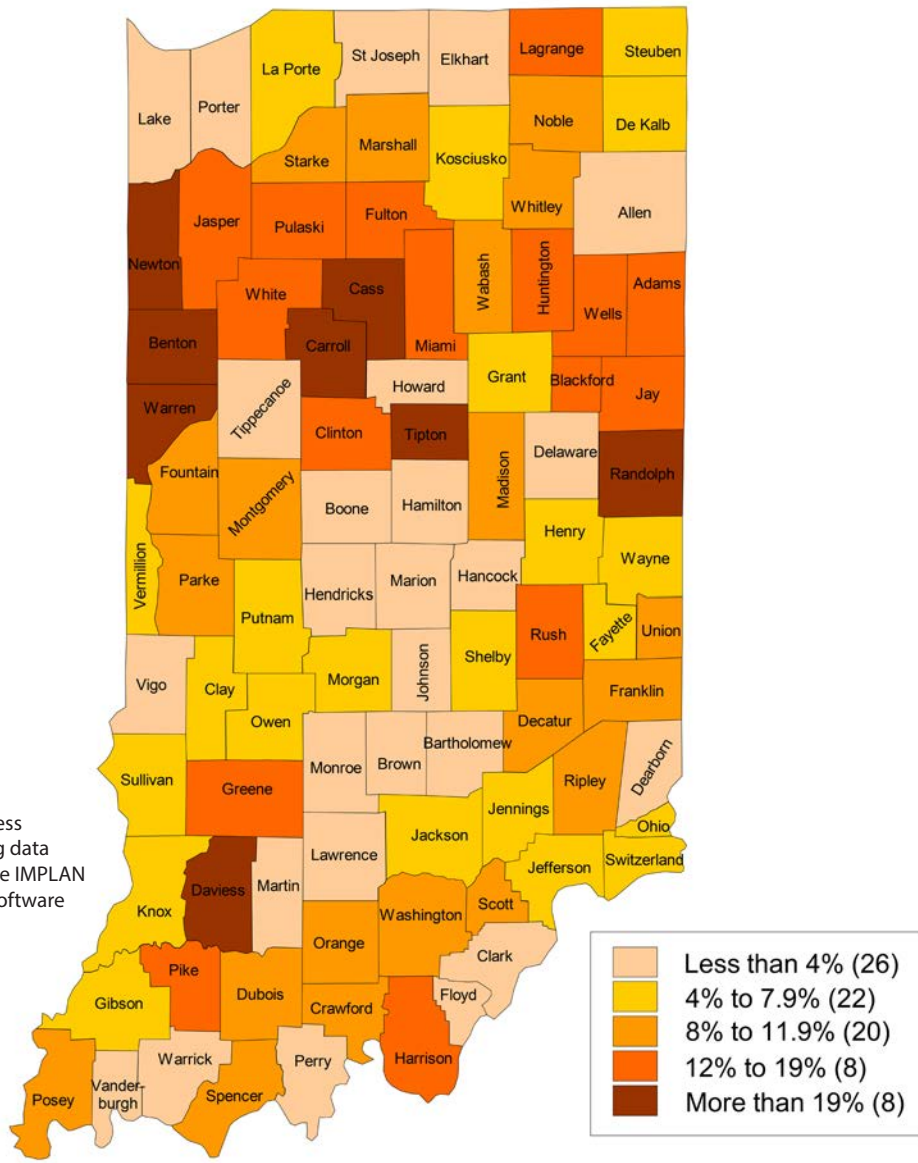
FIGURE 1: INDIANA AGRICULTURE'S TOTAL GDP EFFECTS BY COUNTY, 2012



Indiana's agriculture industry also employs a significant amount of individuals – more than 107,600 workers. As can be expected, agriculture plays a more critical role in the smaller or midsized counties around the state versus urbanized areas with a heavier presence of additional industries (IBRC, 2015b). In fact, the distribution of the quantity of individuals employed within the agriculture

industry mimics the dispersal evident in **Figure 1**. This is again because of the presence of agricultural-related manufacturing and other supply chain firms that employ large quantities of workers. **Figure 2** shows the agriculture employment effects as a share of the total employment by county in 2012.

FIGURE 2: AGRICULTURE EMPLOYMENT EFFECTS AS A SHARE OF TOTAL EMPLOYMENT BY COUNTY, 2012



Source: Indiana Business Research Center, using data from the USDA and the IMPLAN economic modeling software

CONCLUSION

In summary, agriculture is big business in Indiana (economically and in land use consumption) and is not relegated only to the more rural areas of the state. The state has very rich farmland and attractive terrain, which has led to its national prominence in grain and livestock production. In recent years, there has been a great resurgence in interest and concern about wholesome food access (mainly fruits and vegetables) in urban markets. Therefore, Indiana has become a state where commercial agriculture, small farms and urban farming co-exist. This co-existence can only occur if careful consideration is made toward sustainable development and mindful land use – regardless of whether the land in question is in a rural, suburban or urban setting.

This careful consideration ought to include local government incorporating goals and policies concerning agriculture in their comprehensive plans. Local government and planning officials should take the time to familiarize themselves with the local agrarian landscape as well as topics and issues surrounding agricultural land use. Given the breadth of the agriculture industry, it would be prudent to include the agricultural community, local food advocates and agricultural firms in the planning process. The following sections dive into specific agricultural topics and possible land use policies.

* Likewise, one could see how it can be difficult to discern where the agriculture industry “ends” within the valued-added process. Some researchers argue that it should include manufacturing and wholesale outlets, whereas others only include industries with a sizeable share of raw agricultural input.

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URBAN AGRICULTURE

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WHAT IS URBAN AGRICULTURE?

In Indiana and across the country, urban agriculture is receiving greater interest and attention. Urban agriculture is the growing and raising of crops and livestock within the boundaries of a city. Often these crops and livestock are intended for consumption by the local community, sometimes by the person producing the food, but many times it is at a scale where the food is shared or sold as well. Urban agriculture can take multiple forms. It can be a one-acre parcel within city boundaries that is transformed into a for-profit market farm. It can be a church converting a large strip of their property into a community garden. It can be a neighbor raising a few chickens for egg production in their backyard. All of these are examples of growing or raising food within the boundaries of a city.

WHY ARE PEOPLE PURSUING URBAN AGRICULTURE?

Although growing or raising food is an outcome of urban agriculture, it is rarely the only motivation for urban farmers and gardeners. Many urban residents engage in food production because they want to build community, educate youth, improve urban sustainability or lessen the burden of those who struggle to access fresh food, among many other reasons. McClintock and Simpson (2018) were able to distill these motivations into six categories:

- Entrepreneurial – motivated by capitalistic economic development and environmental concerns, but may downplay social concerns
- Sustainable Development – motivated by food security, food quality, public health/nutrition, sustainability, self-sufficiency and community building
- Educational – motivated by education of youth and adults
- Eco-centric – motivated by environmental and agro-ecological sustainability
- DIY Secessionist – motivated by severing ties with the dominant food system, creating an alternative system of food production
- Radical – motivated by social justice, food justice, food sovereignty and anti-capitalist interests

BENEFITS AND CHALLENGES OF URBAN AGRICULTURE: WHY AND HOW TO ADDRESS AGRICULTURE AT THE MUNICIPAL LEVEL

Research shows a wide range of benefits from urban agriculture (Golden, 2013) including:

- Improved access to fresh food
- Increased fruit and vegetable consumption and more healthful food consumption overall
- Reduced blight in neighborhoods
- Increased biodiversity and habitat
- Increased youth development opportunities
- Creation of job and training opportunities
- Small business growth and development

However, it can seem oxymoronic to support “urban” “agriculture,” two areas that are often mutually exclusive and between which a stark geographic divide often exists. The aesthetics, noises, smells and possible health risks posed by raising crops and animals in the city are among the reasons that clear separations between agriculture and urban development often exist. Today, this separation is reinforced by other uses for urban land that enable denser development and higher economic returns. These issues might become central challenges in the urban agriculture conversation in your community, and there is research along with planning and zoning suggestions to help planners navigate this area. As Indianapolis community investor Tedd Grain notes, though urban agriculture might not be directly profitable, it has great potential to enhance the value of real estate and a neighborhood. You can listen to Mr. Grain’s case for urban agriculture’s value as an economic development tool in this short video (excerpted from the Purdue Extension Urban Agriculture Certificate): https://mediaspace.itap.purdue.edu/media/PU-UAC-PM_Communicating-the-Value.mp4/1_idhdll1e1.

Ultimately, the choice to welcome urban agriculture is up to each community. Though it might depart from the suburban image of a neighborhood and forego a more economically profitable use, keep in mind the dynamic social, economic and environmental benefits that urban agriculture can provide.

If you seek to encourage urban agriculture, helping these food producers overcome some primary challenges will be important. Urban food growers face limited and non-traditional land access, use of reclaimed

and sometimes contaminated soils, restrictive legal and political environments, low levels of agricultural expertise, unskilled laborers and the challenge of sustaining social missions in addition to producing food (Pfeiffer, 2014; Reynolds, 2011). Many of these challenges can be directly addressed by creating supportive municipal policies and raising awareness about local resources, such as soil testing assistance.

An important dynamic to consider is that often these projects arise in areas with vacant properties. These properties are likely vacant due to economic depression in the area and thus the population living nearby might be a vulnerable one. In light of resident displacement and other unintended consequences that increased investment in this type of urban area can create, it is important to consider the following recommendations, which are excerpted from the article “The Intersection of Planning, Urban Agriculture, and Food Justice: A Review of the Literature”:

Planners can play a stronger role in the movement for food justice by explicitly considering whether the urban agriculture efforts they plan and promote really do benefit disadvantaged communities. First, planners can embed urban agriculture into long-term planning efforts so that urban agriculture is viewed as a priority, not just a placeholder for future developments on the land. Second, planners can develop mutually respectful relationships with food justice organizations to better understand their constraints and needs. A third strategy is to target outreach, programming, funding, and infrastructure for urban agriculture to organizations led by and benefitting members of historically disadvantaged communities. Fourth, planners can increase the amount of land permanently available for urban agriculture. Finally, planners must confront and counter urban agriculture’s contributions to displacement.” (Horst, 2017)

URBAN AGRICULTURE POLICIES AND ORDINANCES

In the following two sections, considerations for urban agriculture regulation and policy are separated by type of activity. The two types of activity are: 1) growing crops; and 2) raising livestock.

GROWING CROPS

Major areas to consider regarding urban tracts of land under use for growing crops are:

- Use standards that maximize possibilities for urban farmers while also minimizing conflict with neighboring land uses;
- Mechanisms that provide urban farmers with sustained land access; and
- Assisting with access to a water source.

USE STANDARDS THAT MAXIMIZE POSSIBILITIES FOR URBAN FARMERS WHILE ALSO MINIMIZING CONFLICT WITH NEIGHBORING LAND USES

Indianapolis established new use standards around “[Gardens] as a Primary Use” after significant research and public input. Those use standards are included in **Table 1** and can be used to illustrate language that might be used to address certain concerns.

MECHANISMS THAT PROVIDE URBAN FARMERS WITH SUSTAINED LAND ACCESS

Long-term access to urban land is a limiting factor for many urban agriculture projects. If producers do not own the land, they often cannot count on its availability from one year to another given the competing land uses they are up against. In this state of uncertainty, it becomes difficult to make the investments of time and capital that could maximize the potential benefits of an urban farm or garden. In order to facilitate sustained land tenure for urban agricultural use, consider these following policy ideas:

- *Policies that provide urban farmers access and/or ownership options for vacant lands that return to the city’s ownership.*
 - If owning the land is not ideal for an urban agriculture project, consider long-term, low-cost leases to community gardens and urban farms. Multi-year leases help ease the risk and uncertainty in a project’s startup phase.
 - If the sale of a property for agricultural use is ideal, consider re-assessing the property at its agricultural value to lower the tax burden for its owner.

**TABLE 1: USE STANDARDS FOR GARDENS AS PRIMARY USE IN THE CITY OF INDIANAPOLIS
CONSOLIDATED ZONING/SUBDIVISION ORDINANCE**

Concern	Standard
Defining various categories of uses to ensure small-scale personal uses are distinguished from large urban farming or community gardening efforts.	<p>Personal Garden: A private facility or area for the cultivation of vegetables, grasses, fruits, flowers, shrubs, vines, trees and domesticated bees as an accessory use by a resident or occupant of the site whether it be for purposes of producing food or materials. This definition includes the composting of on-site materials. This definition does not include high weeds and grass, nor does it include farming or beekeeping for commercial purposes.</p> <p>Garden as a Primary Use: An area of land managed and maintained by a group of individuals to cultivate fruits, flowers, vegetables or ornamental plants, for personal or group use, consumption or donation. Garden as a Primary Use may be divided into separate plots for cultivation by one or more individuals or collectively. Garden as a Primary Use may include bee-keeping (apiculture) and may include common areas maintained and used by group members.</p>
Allowing for structures that enable storage, gathering space and year-round growing efforts while establishing reasonable guidelines for height and setbacks.	Garden structures, such as greenhouses, hoop houses, storage sheds, gazebos, shelters and cold frames, are limited to a maximum height of 15 feet and shall meet the setback requirements of the district.
Allowing beekeeping while acknowledging public perception of risk related to hives.	<p>Personal beekeeping of domesticated honeybees is permitted in all districts. Without a personal livestock license, the number of beehives on a site shall be limited to eight hives. No beehive shall be larger than 16 cubic feet.</p> <p>Beehives may be located on the ground or on the roof of a building with a permanent foundation.</p> <p>If the opening of any beehive located on the ground opens toward an area on-site or another lot that is an activity area, such as a walkway, play area or patio, then a barrier must be provided to cause the bee flight path to be directed at least six feet above the area.</p>
Allowing composting while encouraging proper waste management	<p>Composting shall be located or designed and constructed to prevent the composting material and compost from sitting in ponded surface water.</p> <p>Refuse must be removed from the site at least once a week.</p>
Desire of many urban agriculture projects to sell products on-site	Sales of products grown on the site is permitted on the site, provided that any structure used for sales is no larger than 100 square feet, not on a permanent foundation and is not located in a required yard area.
Risk of soil contamination in an urban setting and encouraging soil testing and site research prior to growing crops	<p>Food products may be grown in soil native to the site if:</p> <ol style="list-style-type: none"> a. A composite sample of the native soil, consisting of no less than five individual samples, has been tested for lead content and the lead content in the soil is determined to be at or below the Indiana direct-contact standards for lead; and either: <ol style="list-style-type: none"> 1. The City determines through maps, deeds, prior permits or a combination of those sources that the site has only been put to residential or agricultural use in the past; or 2. A composite sample of the soil native to the site, consisting of no less than five individual samples, has been tested for metal content using the US EPA 3050B, 3051 or a comparable method and that (i) the metals arsenic, cadmium, mercury, molybdenum, Nickel, selenium and zinc are determined to be at or below the identified thresholds, as amended, food products may only be grown in raised beds filled with clean top soils. b. As an alternative to meeting the standards in subsection a.1 or a.2 above, food products may be grown in clean soil six inches deep brought to the site without completing a soil test of the native soil.
Possible use and storage of chemicals on-site	Herbicides, pesticides, fertilizer or other chemicals shall not be kept outside and shall be locked when not in use. The site drainage and maintenance must prevent water, herbicides, pesticides or fertilizer from draining onto adjacent property or into a right-of-way.
Activities in a residential area that are noisy	Operation of power equipment or generators may occur between sunrise, but no earlier than 7 a.m., and sunset, but no later than 10 p.m.

City of Indianapolis, 2018

- *Policies that incentivize property owners to make land available for multi-year urban agricultural use.* An example of this type of policy is the Urban Agriculture Incentive Zone enacted in California in 2013. It “allows cities and counties to provide landowners with a property tax deduction in exchange for committing their land to urban agricultural use for at least five years.” (Zigas, 2017)

ASSISTING WITH ACCESS TO A WATER SOURCE

Another key limiting factor for urban agriculture to thrive is access to a convenient, high-pressure water source. Policies to consider:

- Allowing use of hydrants where appropriate
- Subsidizing the reopening of dormant water connections on a vacant property
- Charging agriculture water use rates rather than standard municipal rates

RAISING LIVESTOCK

There is growing interest among city residents in small-scale livestock production, driven by practitioners’ desire to better understand the origin of their food (McClintock et al., 2014). This a national trend, but raising livestock and poultry in urban settings can be more controversial than growing crops under the same conditions. Well-supported, one-size-fits-all zoning or use standards for urban livestock production are not available, but examples of regulatory language exist, including the personal livestock standards in the City of Indianapolis Consolidated Zoning/Subdivision Ordinance. While residents wishing to engage in urban agriculture “must accept restrictions in their choices of enterprises to accommodate the preferred lifestyles of nearby residents” (Ikerd, 2010), this is especially true for livestock and poultry production. Because of the nature of livestock production (e.g., odors, manure accumulation, noises, zoonosis, etc.), residents should know that livestock production may simply not be feasible under some conditions commonly found in urban settings.

Nevertheless, there are numerous factors planners may wish to consider when developing use standards that could allow for livestock ownership while minimizing potential conflict with other uses. Such factors range from quantity and species of animals allowed, animal

housing standards, manure and odor management and inclusion of measures to reduce risks to public health.

SPACE

Often, planners consider allowable animal maximums when developing urban livestock use standards. It is tempting to create these standards based on space requirements of different livestock species. Doing so, however, can be problematic as an animal’s space requirements are influenced by a variety of factors, including, but not limited to, flooring (paved vs. dirt); age of animals (e.g., piglet vs. breeding sow); housing facility (e.g., open-floor vs. aviary; pasture vs. indoor); manure collection system; feeding systems and bunker space; pasture quality; purpose of animal (e.g., breeding vs. growing, meat vs. dairy goat/poultry), among many others. As a result, planners are likely to find wide ranges



of space requirements in the literature that differ based on whether these factors are considered and, if so, to what extent (see references). Thus, creating animal maximums based on generalized space requirements that do not take into account these different factors may be unnecessarily restrictive in some contexts while allowing animal overcrowding in others. This is especially true as new production systems are developed that may allow intensification, even in urban settings (Chitnis and Ebner 2018).

Ultimately, the Board of Animal Health sets animal care standards in Indiana under Indiana Administrative Code 345 Article 14. This code does not set forth animal maximums, but requires that “a person responsible for caring for livestock or poultry must provide the animals

with an environment that can reasonably be expected to maintain the health of animals of that species, breed, sex and age, raised using the applicable production method” (345 IAC 14, 2016). Purdue Extension can offer assistance in interpreting how these standards might apply in different contexts. The Purdue University Department of Animal Sciences has faculty Extension Specialists with expertise in housing and animal welfare across all livestock and poultry species. Equally resourceful are county Extension Educators, including 4-H Extension Educators who often work with livestock and poultry producers operating on similar scales found in many urban livestock and poultry operations.

NOISE, ODOR AND PUBLIC HEALTH

There are several potential land-use conflicts inherent in raising livestock and poultry in urban settings. Perhaps foremost among these conflicts are odor, public health and noise. In many cases, odors can be mitigated or reduced with diligent manure management. Effective manure management is also necessary to limit public health risks that can be associated with housing animals in close proximity to dense human populations. Thus, it is critical that urban livestock and poultry producers have adequate and consistently available means to collect and properly dispose of manure and litter in manners that reduce odor and public health concerns. This includes adequate access to water for cleaning and disinfection protocols. Note that all livestock producers with operations generating greater than 10 cubic yards of manure per year must comply with Indiana’s Fertilizer Material Use, Distribution and Recordkeeping Rule (355 IAC Article 8) regardless of their location (see https://oisc.purdue.edu/fertilizer/pdf/fert_use_rules_and_faq.pdf).

Likewise, planners should consider noises associated with livestock and poultry production. Such noises may come from the animals themselves or from animal handling and equipment use. The amount of noise often depends on the species of livestock, and even the sex of the animal, and there are examples of use standards that prohibit certain types of animals, such as roosters (although new poultry producers should not be surprised if their hens sometimes crow, too).

TOOLS

Table 2 includes use standards employed by the City of Indianapolis that address many of the issues highlighted above. Additionally, Butler (2012) compared zoning ordinances for urban livestock production across 22 U.S. municipalities and the study offers planners examples of different tools available or in use to guide urban livestock and poultry production.

Finally, in many rural counties throughout Indiana, new livestock facilities are required to submit a site-plan prior to siting (Ebner et al., 2016). In these cases, livestock production may be an accepted or approved use within the zoning district, but potential producers



must still submit a site-plan to the county detailing some aspects of their specific operation. Because livestock and poultry production within city limits can be highly nuanced in terms of practices or resources available that could reduce potential conflict with other uses, namely residential uses, it may be helpful to require those interested in producing livestock and poultry (beyond a small number of backyard chickens) in an urban setting to submit a site plan prior to populating their operation. Such site plans could detail the proposed housing system (with space allotment justification), odor and/or noise abatement strategies and manure management/containment protocols, among other requirements of interest. This practice could allow a review of potential operations that takes into account site-specific factors and resources. Again, the numerous Purdue Extension Specialists and Educators with expertise in livestock production, housing, welfare and odor can be resources.

TABLE 2: USE STANDARDS FOR LIVESTOCK AND POULTRY PRODUCTION IN THE CITY OF INDIANAPOLIS CONSOLIDATED ZONING/SUBDIVISION ORDINANCE

Concern	Indianapolis zoning language (City of Indianapolis, 2018)
Identifying which animals are allowed and considered livestock	Personal Livestock: Accessory activity of raising domesticated poultry, rabbits, sheep, donkeys, mules, alpacas, llamas, horses and goats, of which may be standard-sized or miniature, pygmy or dwarf for use by the resident or occupant of the property. This definition does not include domestic dogs or cats, and does not include animals associated with a business activity, such as an agricultural use (farm) or boarding.
Noise issues associated with roosters	Roosters are limited to one per lot and between dusk to dawn the rooster must be kept inside an enclosed coop or similar fully enclosed structure.
Preventing animals from wandering outside owner's property and limiting site of animal housing	Outside exercise area and pasture must be fenced and must not be located in the front yard. Pen, shelter, coop, roost, hutch or other shelter for animals must not be located in a front yard and must meet setbacks required in the district. Animals must at all times be confined to the lot.
Unpleasant odors	Odors from the animals or from animal waste must not be discernible at any property line.
Animal slaughter	Slaughter must be limited to personal livestock, must not be conducted in the front yard, and must be conducted within a completely screened area. Remains must be disposed of and removed from the site within 24 hours.
Manure management	Waste must be collected and removed or composted regularly.

City of Indianapolis, 2018

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