

LIVESTOCK PRODUCTION AND PLANNING: CONFINED FEEDING OPERATIONS

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SUMMARY

In this section, we offer some background on how livestock production has changed over the last few decades but continues to play a large role in Indiana, both from economic and traditional standpoints. We address confined feeding operations (CFOs) specifically, including their benefits and the challenges sometimes associated with integrating livestock production into community planning. Finally, we describe several tools and resources available to planners and communities wishing to address CFOs specifically in their planning processes. The discussion below focuses on CFOs as defined and regulated by the Indiana Department of Environmental Management (IDEM). This might be an important distinction for some counties as IDEM defines CFOs based on a uniform set of characteristics of the farm, while some counties might use slightly different definitions (e.g., higher or lower animal numbers). Thus, there are cases throughout Indiana where an IDEM-regulated CFO does not meet the definition of CFO by the county. The converse is also true when a county definition of CFO in an ordinance does not meet the definition set by IDEM. These discrepancies, of course, have impact on which farms are actually impacted by ordinances at the county level. For the sake of clarity, we are defining CFOs as those farms regulated by IDEM as CFOs.

WHAT IS IT?

Livestock production has always played a large role in Indiana agriculture, both in its traditions and its outputs. Livestock production systems, however, have undergone significant changes over the past four decades, and this is true for Indiana livestock production. Animals are much more efficient, producing more meat, milk or eggs per unit of feed. Like other types of farming, the number of farms producing livestock has decreased over time, while the number of animals (or pounds of milk, etc.) produced per farm has increased (USDA-ERS 2013).

At the same time, livestock production has largely moved indoors for a variety of reasons. In general, indoor systems can afford a producer greater control



of numerous factors that affect the animal's health and, in turn, the animal's efficiency. For example, indoor systems might allow a producer to better ensure animals receive the proper nutrition required at different stages of their lives. Indoor production systems can also allow a producer to manage climate and better protect animals from heat/cold stress, predators and some diseases.

As a result, the overwhelming majority of food animals produced in Indiana, by weight and number, are produced in indoor systems or on lots. The State of Indiana defines such farms as CFOs when the number of animals on the farm reaches a defined number (see **Table 1**). Concentrated Animal Feeding Operations (CAFOs) are a subset of CFOs and are defined by a greater number of animals (see Ebner and Hong 2017a for more detailed definitions).

CFOs in Indiana are regulated by numerous offices and agencies at the state level, both directly and indirectly (see Ebner and Hong 2017b for review). Briefly, all CFOs must be issued a permit through the IDEM prior to construction. IDEM definitions of CFOs and CAFOs are provided in **Table 1**. In general, obtaining a CFO permit requires the CFO operator to provide plot/farmstead maps, structure designs, a manure (nutrient) management plan, detailed management plans and water monitoring plans (among other requirements). This is all in an effort to minimize potential environmental impact (a detailed description of the CFO permitting process can be found in IDEM 2014). The Office of the Indiana State Chemist regulates the sale, transport and application of manure as fertilizer across all size livestock farms with objectives similar to those of IDEM, and some specific requirements for handling manure generated from CFOs.

TABLE 1: INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (IDEM) CONFINED FEEDING OPERATION (CFO) AND CONCENTRATED ANIMAL FEEDING OPERATION (CAFO) DEFINITIONS BY NUMBER OF ANIMALS

Animal and/or Operation System	CFO (Animal Numbers)	CAFO
Swine: Growers, Finishers, Sows (> 55 lbs.)	≥600	≥2,500
Swine: Nursery Pigs (< 55 lbs.)	≥600	≥10,000
Beef: Cattle	≥300	≥1,000
Beef: Cow/Calf Pairs	≥300	≥1,000
Dairy: Mature Dairy Cows	≥300	≥700
Dairy: Other than Mature Dairy Cows (Dairy Heifers and Calves, Veal Calves)	≥300	≥1,000
Chickens: Non-layers (Non-Liquid Manure System)	≥30,000	≥125,000
Chickens: Layers/Broilers (Liquid Manure System)	≥30,000	≥30,000
Chickens: Layers (Non-Liquid Manure System)	≥30,000	≥82,000
Ducks: Liquid Manure System	≥30,000	≥5,000
Ducks: Non-Liquid Manure Systems	≥30,000	≥30,000
Turkeys	≥30,000	≥55,000
Horses	≥500	≥500
Sheep/Lambs	≥600	≥10,000

Adapted from IDEM, 2014

WHY ARE PEOPLE INTERESTED?

As a state, Indiana ranks fifth in swine production, fourteenth in milk production, second in egg production and first in duck production (USDA-NASS 2017). Numerous recent studies are available quantifying the contributions these different livestock sectors make to Indiana’s economy (IBRC 2017; Wilcox et al. 2013; Ayres et al. 2009; Mayen & McNamara 2007). CFOs in particular are businesses with often-large inputs (labor, feed, construction, etc.). Sourcing these inputs can have a multiplier effect on employment, effectively creating jobs in allied industries that provide materials or services. Most recently, the Indiana Business Research Center (IBRC 2017) provided estimates on employment multipliers, or the number of jobs created outside of the farm for every employee on the farm, for different livestock species in Indiana. Some of those data are summarized in **Table 2**.

TABLE 2: EMPLOYMENT MULTIPLIER EFFECTS BY LIVESTOCK SPECIES IN INDIANA

Species	Multiplier
Beef Cattle	2.04
Dairy	2.27
Hogs	1.41
Poultry and Eggs	7.39

Adapted from IBRC, 2017

Using “Beef Cattle” as an example, for every 100 individual employees working directly with the farms, 104 jobs are created in allied industries for a total of 204 jobs.

As noted previously, livestock production has a long history in Indiana. CFOs may also provide avenues for families or individuals to remain in or begin farming due to the relatively smaller initial costs and integrated structure of the different industries that can alleviate risk (Harper 2009). This notion is supported by data indicating that the average age of CFO owner/operators in Indiana is lower than the average age of farmers in general (Ayres et al., 2009).

WHY WOULD YOU ADDRESS IT IN A COMPREHENSIVE PLAN?

Over the past three decades, and as farm sizes grew and production practices changed, more Indiana counties began to include specific language in both their comprehensive plans and zoning ordinances regarding CFOs. At the time of this writing, 64 of Indiana's 92 counties operate under zoning ordinances containing standards specifically for CFOs (Ebner et al., 2016).

Some counties wishing to attract or retain livestock production, and recognizing that modern livestock production includes CFOs, have included language stating these goals clearly in their plans (e.g., Benton County 2018; Decatur County 2017). Similar to countless other approved uses, CFOs might be incompatible with some other approved uses and vice versa. A goal of planning and zoning is to minimize land use conflict, and county plans may also provide guidance on the best locations or zones for CFOs so different uses can co-exist and multiple goals of the county can be met.

WHAT ARE CHALLENGES?

The goals of a community are always multi-factorial. In an effort to reduce conflict between those goals, many communities have sought to foster livestock production, specifically CFOs, by creating defined areas or zones where such uses are approved, or requiring distance separations between CFOs and other uses (Ebner et al., 2016). The major challenge is in defining appropriate separation distances, i.e., distances that reduce potential conflict, but are not excessive or overly burdensome to the parties involved. Most potential issues associated with CFOs are not monolithic and impacted by various factors including, but not limited to, production system, animal species and land topography. Likewise, an increasing number of management practices are available to livestock producers that can mitigate potential impact of CFOs on neighboring uses. Thus, operators of CFOs located downwind from other uses, employing odor abatement strategies and injecting manure might expect to have potentially less conflict in the long run with neighbors than those operating CFOs not employing similar practices. This, of course, does not account for the pre-operation objections the operator might face.

It is also important to note that with many concerns related to CFOs, there is yet little research that affords the ability to quantify the true risk or potential impact. While issues related to public health are often raised (e.g., impact of antibiotic use and emissions, etc. on neighbors) and that risk should be acknowledged, to date, the treatment of CFOs as uniform public health hazards is not supported by a large body of scientific literature or scientific consensus (O'Connor et al., 2017; Nachman et al., 2017). Similarly, risks to nearby property values (also often voiced as a concern) are difficult to quantify without taking a multitude of factors into consideration (e.g., size, location, county characteristics, housing price, species, etc.; see references).

From a planning perspective, there remains some controversy over home rule and the types of standards that counties may require of CFOs. Specifically, there is lack of clarity in what a county may require beyond siting requirements, and whether those requirements could conflict with existing state regulations or jurisdictions. For example, IDEM's Confined Feeding Program does not regulate odor and requirements for CFOs to employ odor abatement practices are not uncommon in Indiana zoning ordinances. However, can a county require that manure be injected versus sprayed (specifically to reduce odor) when manure storage, handling and application is regulated by IDEM and/or OISC?

Finally, regardless of community decisions in planning and/or zoning, in no case can local standards remove regulations required at the state level. Thus, even if a community does not address CFOs explicitly, all CFOs are still required to comply with all IDEM, OISC and other state requirements and regulations. At the same time, counties may employ same, different or additional zoning or siting standards to livestock farms that are not permitted CFOs (i.e., livestock farms of any size) if they choose. Thus, siting standards for livestock production do not have to be CFO-exclusive.

WHAT DOES IT LOOK LIKE?

Numerous resources are available to planners, producers and counties wishing to address CFOs in their plans or zoning ordinances. Two examples of counties (Benton and Decatur) with recently updated comprehensive plans containing language specific to CFOs are included in the references.

The Indiana Land Resource Council provides guidance on how to incorporate CFOs into development or zoning plans (ILRC 2014). The document contains three suggested example ordinances, each containing a large set of tools available to planners that could be used to reduce land use conflict associated with CFOs. The three examples represent three different approaches to regulation, but, as noted by ILRC, the three examples are not mutually exclusive and could be combined in different manners most appropriate for a specific community.

Finally, many issues related to CFOs center on odor. CFOs in Indiana, however, are not regulated based on odor. Currently, there are numerous tools available to individuals involved in CFO siting that are designed to aid in identifying sites where the CFO might have lowest impact on neighbors, specifically when it comes to odor (Jacobson et al., 2017; PAAQL 2017). In many cases, producers and others might reduce community

conflict by employing such tools at the onset of their site identification process. The Purdue Agricultural Air Quality Laboratory (PAAQL) has developed an odor setback model (PAAQL 2017) that incorporates facility size, types of animals, amount of manure generated, prevailing winds/weather patterns and odor abatement practices, among other factors, to recommend setback distances and predict best locations for CFOs. Producers and others have used this model throughout the state.

Finally, Purdue University Extension recently completed a comprehensive analysis of all Indiana county zoning ordinances to begin to compare how CFOs are regulated across counties. In the report, zoning standards of 64 Indiana counties identified as having CFO ordinances were catalogued and compared (Ebner et al, 2016). The research allows planners to quickly compare standards across counties with similar or dissimilar land uses, population and housing densities, and animal densities, among other factors (Ebner et al, 2017).



REFERENCES

Confined feeding operation rules and definitions

Ebner, P., & Hong Y. (2017). What is a confined feeding operation? *Purdue University College of Agriculture*. Retrieved from ag.purdue.edu/cfo/Pages/what-is-cfo.aspx

Ebner, P. & Hong Y. (2017). Regulation of livestock production in Indiana: who does what? *Purdue University College of Agriculture*. Retrieved from ag.purdue.edu/cfo/Pages/livestock-regulation.aspx

Hong, Y. & Ebner P. (2017). Manure rules in Indiana. *Purdue University College of Agriculture*. Retrieved from ag.purdue.edu/cfo/Pages/manure-rules.aspx

Indiana Administrative Code [IAC] 327. Article 19. (2012). Confined feeding operations. *State of Indiana*. Retrieved from www.in.gov/legislative/iac/T03270/A00190.PDF

Indiana Department of Environment Management [IDEM]. (2014). Guidance manual for Indiana's confined feeding program. *State of Indiana*. Retrieved from www.in.gov/idem/landquality/files/cfo_guidance_manual.pdf

Office of Indiana State Chemist. (2018). Rule 355 IAC Article 7. Certification for distributors and users of fertilizer material. *Indiana General Assembly*. Retrieved from www.in.gov/legislative/iac/T03550/A00070.PDF?&iacv=iac2016

Office of Indiana State Chemist. (2018). Rule 355 IAC Article 8. Fertilizer material use, distribution and recordkeeping. Retrieved from www.in.gov/legislative/iac/T03550/A00080.PDF

Economic impact of livestock production in Indiana

Ayres, J., Keenon, R., Nennich, T., & DeBoer, L. (2009). Confined animal feeding operations. *Purdue Agriculture: Agricultural Economics*. Retrieved from www.agecon.purdue.edu/extension/programs/cafo.asp

Harper, A. (2009). Hog production contracts: the grower-integrator relationship. Virginia Extension Publication No. 414-039. *Virginia Cooperative Extension*. Retrieved from vtechworks.lib.vt.edu/bitstream/handle/10919/48173/414-039_pdf.pdf?sequence=1

Indiana Business Research Center, Kelley School of Business, Indiana University. (2017). The economic impact of animal agriculture in Indiana regions: an analysis of existing and prospective producers. *Indiana Business Research Center*. Retrieved from www.ibrc.indiana.edu/studies/Livestock-Report-2017.pdf

Mayen, C., & McNamara K. T. (2007). Economic impact of the Indiana livestock industries. Purdue Extension ID-354. *Purdue Extension*. Retrieved from www.extension.purdue.edu/extmedia/ID/cafo/ID-354.pdf

USDA Economic Research Service [USDA-ERS]. (2013). 2012 census volume 1, chapter 1: state level data (Indiana). *United States Department of Agriculture: National Agriculture Statistics Service*. Retrieved from www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Indiana/st18_1_001_001.pdf

USDA National Agricultural Statistics Service [USDA-NASS]. (2018). 2018 state agriculture overview for Indiana. *United States Department of Agriculture: National Agriculture Statistics Service*. Retrieved from www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=INDIANA

Wilcox, M., Olynk Widmar, N., Yadavalli, A., Widmar D., and Foster, K. 2013. An Overview of Indiana Animal Agriculture: Perspectives on the Beef, Dairy, Hog and Poultry Industries. Purdue Center for Regional Development.

Public health

O'Connor, A. M., Auvermann, B. W., Dzikamunhenga, R. S., Glanville, J. M., Higgins, J. P. T., Kirychuk, J. M., Sargeant, S. P., Totton, S. C., Wood, H., & Von Essen S.G. (2017). Updated systematic review: associations between proximity to animal feeding operations and health of individuals in nearby communities. *Systematic Reviews*. Retrieved from systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-017-0465-z

Nachman, K. E., Lam, J., Schinasi, L. H., Smith, T., Feingold, B. J., & Casey J. A. (2017). Systematic review regarding animal feeding operations and public health: critical flaws may compromise conclusions. *Systematic Reviews*. Retrieved from systematicreviewsjournal.biomedcentral.com/articles/10.1186/s13643-017-0575-7

Property values: Indiana-specific

Indiana Business Research Center. (2008). The effects of regulated livestock operations on Property Values in Selected Indiana Counties. Kelley School of Business, Indiana University.

Kueth T. H. & Keeney R. (2012.) Environmental externalities and residential property values: externalized costs Along the house price distribution. *Land Economics*, 88(2), 241–250

Property values: Midwest-specific

Herriges, J. A., Secchi, S., & Babcock, B.A. (2005). Living with hogs in Iowa: the impact of livestock facilities on rural residential property values. *Land Economics*, 81(4), 530–545.

Huang, H., Sherrick, B., Gomez, M., & Miller, G.Y. (2003). The impacts of swine production on land values in Illinois. Illinois Department of Agriculture, Swine Odor Strategic Initiative.

Isakson, H. & Ecker M. (2008). Analysis of the impact of swine CAFOs on the value of nearby houses. *Agricultural Economics*, 39, 365–372.

Kilpatrick J. (2015). Animal operations and residential property values. *Appraisal Journal*, 83, 41-51.

Confined feeding operations ordinance information

Benton County, Indiana comprehensive plan update (draft). (2018). Benton County, Indiana. Retrieved from www.bentoncounty.in.gov/files/ml/BentonCompPlanUpdate_Draft_Full_20180317.pdf

Plan Decatur County 2016: comprehensive plan update. (2017). *Home of Decatur County*. Retrieved from www.decatourcounty.in.gov/doc/area-plan-commission/updates/2016_comprehensive_plan_update.pdf

Ebner, P, Ogle, T, Hall, T, DeBoer, L, & Henderson J. (2016). County regulations of confined feeding operations in Indiana: an overview. ID-466-W. *Purdue University College of Agriculture*. Retrieved from ag.purdue.edu/extension/cfo/Reports/_Overview.pdf

Ebner, P, Ogle, T, Hall, T, DeBoer L, & Henderson J. (2016). Land use regulations of confined feeding operations in Indiana: county factsheets. ID-467-W. *Purdue University Extension*. Retrieved from www.cdext.purdue.edu/collaborative-projects/cfo-study/

Ebner, P, Hong, Y, Ogle, T, Hall, T, & DeBoer L. (2017). 37 factors that could affect CFO siting in Indiana. *Purdue University College of Agriculture*. Retrieved from ag.purdue.edu/cfo/Documents/37_Factors_that_could_Affect_CFO_Siting.pdf

Indiana Land Resource Council [ILRC]. (2014). A guide for local land use planning: model agricultural zoning ordinances. *State of Indiana*. Retrieved from www.in.gov/isda/files/ILRC_Model_Ordinances_-_Updated_2014.pdf

Odor setback models/tools

Jacobson, L., Schmidt, D., & Wood S. (2017). OFFSET odor from feedlots setback estimation tool. *University of Minnesota Extension*. Retrieved from <https://extension.umn.edu/manure-management/manure-air-and-water-quality#odor-from-feedlots-setback-estimation-tool-%28offset%29-1132060>.

Livestock odor setback model – Purdue University. (2017). *Purdue Agricultural Air Quality Laboratory*. Retrieved from engineering.purdue.edu/~odor/setback.htm