



Information for an Industry on the Move

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ANIMAL AGRICULTURE INITIATIVE  
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## Animal Caretaker Observations - Feeding and Watering

By: Madonna Gemus-Benjamin, Department  
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The Michigan State University Extension (MSUE) Pork  
Work Group will provide 1 or 2 examples of PQA required  
Standard Operating Procedures (SOP), published in Pork  
Quarterly articles and available on the MSUE website.  
[http://msue.anr.msu.edu/resources/pork\\_quarterly](http://msue.anr.msu.edu/resources/pork_quarterly).  
Contact [gemus@msu.edu](mailto:gemus@msu.edu) for a word document.

PQA Version 3 requires that producers have written  
Standard Operating Procedures for specific areas of  
Pork production, including:

1. Animal caretaker daily observations
2. Handling
3. Piglet processing
4. Feeding and watering protocols
5. Treatment management
6. Needle usage
7. Biosecurity
8. Rodent control
9. Caretaker Training

*Manuals and SOP's can be in paper or electronic form,  
but need to be accessible at the site.*

### **SOP: Animal Caretaker - Feeding and Watering**

There are numerous ways to execute this procedure. The  
following is a template that may be useful for creating  
standard operating procedures that best suit your farm.  
Feel free to edit or change procedures as you see fit.

- Does the site have a written SOP for feeding and  
watering protocols?
- Do the pigs have access to feed and water  
according to the site's written SOP?

Pig Weight in Pounds	Feed per day in Pounds	Pig Weight in Pounds	Feed per day in Pounds
10	0.67	120	4.93
20	1.40	140	5.26
30	2.09	160	5.53
40	2.75	180	5.75
50	3.15	200	5.93
70	3.83	210	6.01
90	4.39	220	6.09
100	4.64	250	6.20
110	4.86	275+	6.35

*Table 1. Average feed requirement based on weight. Credit is given to Kansas State Research and Extension for table information.*

- Are the feeders in good state of repair to allow for unobstructed feed delivery and not causing or posing an imminent threat of injury to the pigs?

#### **Feeding Protocol**

- Feeding should take place at consistent times throughout the day, every day.
- Bulk feed needs to be stored in bins and covered to prevent vermin from accessing the feed.
- Bulk bins need to be checked daily to ensure that neither feed shortage nor feed bridging occurs.
- Spilled feed needs to be removed immediately and disposed of appropriately.
- Automated feed systems must be checked daily to ensure that out-of-feed events do not occur.
- Lack of feed can increase aggression, promote stomach ulcers, promote hemorrhagic bowel syndrome, leading to decreased daily gains and reduced feed intake.
- Feeders need to be in good repair to allow for unobstructed feed delivery.
- Feeders need to be in good repair so that animals are not injured.
- There should be enough feeding space for all pigs in a given group to consume their daily allotment without excessive fighting or competition.
- Caretakers should be trained to identify pigs with

low body condition scores.

#### **Adjusting Feeders**

Feed needs to be offered to pigs in quantities which meets their needs. It is important to find a balance between offering enough feed to maximize growth while limiting feed waste.

#### **Supplies needed to adjust feeders**

- Gate rods/scrapers.
- Guidelines for feeder adjustment.

#### **Procedure for adjusting feeders**

- Use the manufacturer guides that match the type of feeders being used.
- Compare the recommendations to the amount of feed that is in the pan.
- If there is a disparity between the recommendations and the amount of feed in the pan adjust feeders accordingly.
- If there is too little feed in the pan, or the feeder is too tight, check to make sure that the feeder isn't plugged before adjusting the apparatus to increase feed flow rate into the pan.
- Adjustments should be made in small increments and pigs should be given several hours to consume the feed. After the pigs are done eating examine the amount of feed left, if there is any, to determine if the feeder is correctly adjusted.

## Watering

Are the waterers in a good state of repair and positioned to allow for unobstructed water delivery and not causing or posing an imminent threat of injury to the pigs?

Stage of Life	Gallons/Head/Day
Pigs less than 60 lbs.	0.7
Pigs weighing between 60-119 lbs.	2.5
Pigs between 120-179 lbs.	4
Pigs greater than 180 lbs,	4
Gilts	3
Boars	8
Sows and Litters	5
Gestating Sows	4

*Table 2. Average water requirements by life stage. Credit for table information is given to Jerry May, Michigan State University Extension*

Stage of Life	Flow Rate
Nursing/hot nursery piglets	1 cup (250 cc) per minute
Pigs 25-50 lbs.	2 cups (500 cc) per minute
Pigs from 50-125 lbs.	3 cups (750 cc) per minute
Finishing Hogs 125 lbs-market weight	4 cups (1,000 cc) per minute
Sows and Boars	2 quarts (2,000 cc) per minute

*Table 3. Appropriate water flow rates based on life stage. Credit for table information is given to North Carolina State University Extension*

### Watering Protocol

All animals must have free access to water.

The general recommendation is to have 1 nipple drinker for every 15 pigs, or 1 bowl drinker for every 30 pigs.

The quality of water which pigs receive must be monitored.

Waterers must have an appropriate flow rate for the age group.

The height of the waterers must be appropriate for the age group.

Watering systems must have the capacity to supply water to many pigs at once, especially at times when the weather is hot.

Internal diameter of the supply line needs to be measured in wet/dry feeders and cup waterers.

- The internal diameter should be large enough to permit adequate water flow to all waterers in the event that all waterers are used simultaneously.

Use the appropriate water pressure recommended by manufacturers.

Water delivery systems need to be in good enough conditions so that water is delivered unobstructed to waterers.

There should be enough access to water to prevent excessive fighting and competition.

Water troughs need to be examined for leaks on a regular basis and cleaned daily, if water troughs are used..



The NEW Veterinary Feed Directive (VFD) for medically important feed-grade antibiotics and prescription rule for water-based antibiotics TAKE EFFECT ON JANUARY 1, 2017.

## Don't Wait...Be Ready!

Beginning January 1, 2017, a Veterinary Feed Directive order must be presented to purchase feeds containing specific medications. For more information on this, visit: [www.michigan.gov/vfd](http://www.michigan.gov/vfd). A veterinary-client-patient-relationship is required to obtain a Veterinary Feed Directive. For a list of veterinarians in your area, visit: <https://www.globalvetlink.com/products/myvetlink>

# Emergency response to manure spills – Are you prepared with a Manure Spill Kit? Part 3.

***In the case of any spill, particularly manure spills, livestock producers should prepare a spill kit to handle a manure spill.***

By: Shelby Burlew, Livestock Environmental Educator, MSU Extension

*There are no simple solutions to a manure spill, but thinking through your specific situation, and monitoring daily can help prevent, or at least minimize, the environmental risks and potential regulatory issues.*

Farmers everyday try to account for a whole variety of factors when loading, hauling or spreading manure the fields. This includes: weather, soil saturation, manure coverage, cover crops, soil types, slope and direction, and depth of cultivation. On the other hand, there is one thing that can never be completely accounted for and those are the events that cannot be controlled – the blown hose, the punctured tire, the cracked irrigation pipe or any one of a hundred other possible accidents or failures. While these accidents may be common enough (even expected) – they can only be planned for and not prevented entirely. Michigan State University Extension recommends that all livestock producers have a manure spill kit handy and more importantly have an emergency response plan in place for manure spills.

In the case of a manure spill whether it be at storage, loading, hauling or out the field, it is better to be prepared than not. A great way to prepare is to have a “Manure Spill Kit” assembled and ready to go. A spill kit does not have to be complicated or hard to put together. Rather, it is just a collection of tools and supplies, gathered and ready to use in the case of a manure spill.

Dr. Kris Kohl, agricultural engineer with Iowa State University, suggests the following items be assembled into a trailer or pick-up sized spill kit.

- Copy of complete Emergency Response Plan (including site maps and emergency numbers)
- 25 square hay/straw bales (use to block a culvert or to build a berm/diversion)
- 10 T-Posts (use to support plywood or bale stacks)
- 14” diameter PVC pipe (4 3’ sections and 2 4’ sections)

- Several 6 mil plastic sheets – approximately 12’ X 25’ (use with duct tape to cover tile inlets or other sensitive areas)
- 4 bags bentonite chips (use to plug small gaps when creating a berm or diversion)
- 1 sheet 4’ X 4’ plywood (use to block culverts, round the plywood on one end to fit the curve of the ditch)
- Pliers – 1 each (vice grips, fencing pliers, channel lock pliers, standard pliers)
- Hammers – 1 each (12 oz. and 3 lb)
- 1 utility knife
- 1 hand saw
- 1 hatchet
- 1 post driver
- 1 roll duct tape
- Bailing wire
- Sand shovels

Along with the emergency response plan, this manure spill kit should be readily available to use in case of a manure spill. Timing is essential in getting any spill under control and contained – on a slope of less than 2% liquid manure will flow as fast as 5 feet per second.

Sometimes the trailer- or truck-mounted spill kit may not always be available or even an option for every farm situation. Michigan State University Extension recommends the use of a small-scale spill kit to help ensure some level of preparedness for most situations. This spill kit can be stored away in a tractor or pickup cab and includes a roll of duct tape, 12’ X 25’ 6 mil plastic sheet, utility knife and a shovel. This spill kit is ideal for controlling or containing a small spill before it turns into a large scale spill.

# The future of swine castration in the United States

## Part Two: A Global Perspective

By: Dr. Sarah Ison, Department of Animal Science and Extension, MSU

This article is the second in a two part series on swine castration. It intends to provide information on what the future may hold for United States pork producers with regards to swine castration, based on what is happening globally. The article provides an overview of the global situation from a consumer, producer and pig perspective.

### **Castration: the current global situation**

#### China

The world's largest pork producer is China, which houses more than half the world's pigs, and is also the biggest consumer of pork products. Pork production in China is rapidly changing from traditional backyard pork production, to large, industrial scale farms. Concern over pig welfare is increasing, with rapid economic growth, modernization, a growing middle class, and globalization, it is likely to become of greater concern in the future. As such, the first welfare codes of practice for livestock in China were due in June this year, although it is not clear if these will be legislated or recommended. Chinese pork consumers are particularly sensitive to boar taint [1], so male pigs are predominantly physically castrated. However, China is a net importer of soy-bean protein and feed grains. This means raising intact or uncastrated males, to improve feed efficiency, and increase lean meat output, would be a significant advantage to Chinese pork production [2]. The use of immunological castration has received great research interest, and the resulting pork products are considered acceptable by Chinese consumers.

#### Europe

The next largest pork producer is the European Union (EU; currently consisting of 28 member countries). The EU has put in place a 'voluntary' ban on castration, with a goal to phase out physical castration by January 1, 2018 [3]. The first step towards this goal, was to implement castration with the use of anesthesia and/or prolonged pain relief by January 1, 2012. The term 'voluntary' is used here because the experts involved in setting up this initiative wanted the market to solve the issue, rather than legislation, which has traditionally been the case in the EU. For example, EU legislation banned gestation stalls beyond four weeks into gestation on January 1, 2013. Using this method encourages

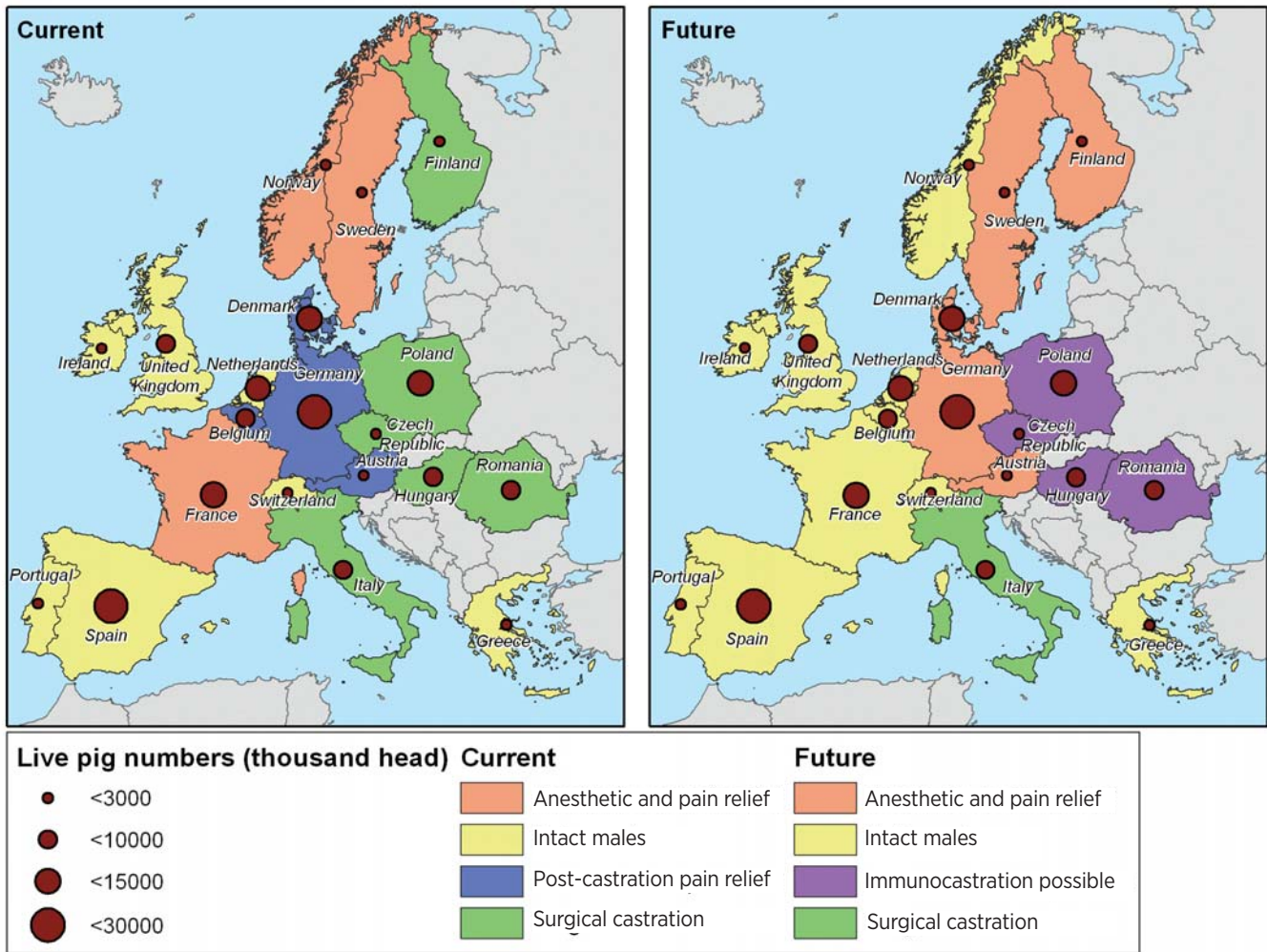
the market to create viable solutions, rather than imposing a strict, and potentially unachievable deadline.

The EU makes for an interesting case study due to the diversity in pork production

methods across the 28 member countries [3]. The map on page 6 demonstrates the existing method (on the left) with regard to castration based on the majority percentage of male pigs, and future plans on the right for countries where information is available. This includes several EU countries, Norway and Switzerland. The United Kingdom (UK), Ireland, Spain, and Portugal already raise predominantly males, which is possible as hogs are slaughtered at less than 88 kg (or 194 lbs.) [1]. The Netherlands and Belgium have recently switched, and are increasingly raising boars or immunologically castrated (IC) barrows. For pigs that are castrated in the Netherlands, CO<sub>2</sub> anesthesia is used during castration, and in Belgium, pigs are given post-castration pain relief [3]. Many countries already use anesthesia, pain relief or both under legislation, or are moving towards this in the near future, for example, Denmark aims to stop castration without anesthesia and pain relief by 2018 and Germany by 2019 [3]. According to the report, Italy and the eastern EU countries have no sense of urgency regarding the castration ban, however, the Czech Republic, Hungary, Poland and Romania consider IC to be a possibility [3].

Italy has the highest carcass weight category at around 121 kg (or 267 lbs.) [1], which could explain their reluctance to move towards intact male pork production, due to the high risk of boar taint and unwanted behavior. However, research into IC is emerging for Italian cured pork production (where pigs are slaughtered at 9-10 months old, and up to 170 kg or 375 lbs.), indicating they could be considering it as an option [4]. Interestingly, as of 2014, grocery stores in the Netherlands no longer stock pork from physically castrated barrows [3]. Belgium has an important export market, so pork destined for domestic use include intact males or IC barrows, whereas pork for





**MAP:** Situation in selected European countries (as of the 2014 progress report [27]), with current (left) and future (right) plans with regard to castration as the European Union implements a ‘voluntary’ ban by 2018.

export are physically castrated with post-castration pain relief [3].

#### Other global pork powerhouses

The remaining ‘top ten’ global pork powerhouses include: Brazil, Russia, Vietnam, Canada, the Philippines, Japan and Mexico. For Canadian producers, castration performed after 10 days must be done with anesthetic and pain relief, and as of July 1, 2016, castration at any age must be done with post-procedural pain relief, according to the National Farm Animal Care Council (NFACC) code of practice for pigs (p.33) [5]. Brazil has increased efforts to abide by EU standards in order to meet market demands [6]. Marketing of intact males is not permitted in Brazil, but IC is used, and is favored by large Brazilian companies in terms of improving pig welfare.

#### **Potential alternatives for US pork production**

Pig castration is a complex issue, with implications for all those involved in the pork supply chain. Since there are no suitable FDA approved products for pigs to provide anesthesia during physical castration and post-procedural pain relief, it is unlikely to be an option in the near future. Additionally, the average live slaughter weight of hogs in the US has risen to around 285 lbs. (or 130 kg) [7], producing a high risk of boar taint and unwanted sexual and aggressive behavior from raising intact males. Therefore, marketing intact male pigs, as practiced in the UK, Ireland, Greece, Portugal and Spain, where the majority of pigs are slaughtered at less than 88 kg (or 194 lbs.), does not seem to be a viable option in the near future either. Significant changes would need to be made throughout the supply chain in order to accommodate a smaller carcass size.



However, with increasing research into other methods to raise intact males, a more effective longer-term solution may include genetic lines with reduced risk of boar taint, alongside methods for boar taint

detection in slaughter plants, and management practices adapted to producing intact males [11,12]. Interestingly, one study conducted consumer taste tests for boar taint, using meat from gilts, low, or medium-high boar taint carcasses [13]. This study identified three clusters of pork tasters, one was 'pork lovers' who gave high scores to all samples, another was 'boar-meat lovers' who gave high scores for the medium/high boar taint samples, and 'boar taint rejecters' for those who did not enjoy the boar taint samples. This indicates a niche market for consumers who enjoy boar taint, providing a possible route for carcasses identified as having boar taint at slaughter.

The use of immunological castration (using IMPROVEST®) is a possible solution. Improvest® was approved by the US Food and Drug Administration (FDA) on March 22, 2011 [8]. Using Improvest® comes with substantial improvements in production efficiency, harnessing the advantages of producing intact males, which adds value to the entire pork supply chain. An estimated net financial gain for US pork producers is \$5.32 per IC market hog, which includes \$2/head feed saving, \$6.71/head at for optimal weight and carcass premium, \$1.61/head for a reduction in labor costs associated with physical castration and a reduction in mortality, and also takes into account the \$5/head cost of implementing immunological castration (labor, drug costs) [9]. In addition, the packer is expected to achieve a net gain of \$5.04 per IC carcass [9].

IC barrows are deemed safe to eat, with no residues that could affect human health [8], however, consumers may have concerns, which are addressed in the Improvest® consumer resource center. One consumer studies in four European countries (France, Germany, the Netherlands and Belgium) indicated that over two thirds of respondents preferred IC over physical castration with anesthesia [10]. As explained in this article, Australia was the first country to approve the drug in 1998, and in 2013, use of the drug increased from 30 to 50 %. New pharmaceutical products take time to "catch on", however, as information on the benefits of this product grow, its use is increasing. As the

2018 voluntary ban on physical castration looms in the EU, Belgium considers immunological castration to be the best option, however, other EU countries, such as Denmark do not currently consider it to be an adequate solution [3].

Stopping the use of physical castration could be a way to promote sustainability, with strong economic and environmental advantages. As well as this, it provides the opportunity to boost social responsibility, by solving a pig welfare concern. This could be a win-win situation for ethical and sustainable pork production in the United States.

## References

- [1] Bee et al. Entire male pig production in Europe, *Anim. Prod. Sci.* 55 (2015) 1347-1359.
- [2] Jiang & Hennessy. The Chinese Pork Industry and Immunological Castration. *The Pig Site.* (2012).
- [3] First progress report from the European declaration on alternatives to surgical castration of pigs. (2014) 1-23.
- [4] Pinna et al. Effect of vaccination against gonadotropin-releasing hormone (GnRH) in heavy male pigs for Italian typical dry-cured ham production. *Meat Sci.* 110 (2015) 153-9.
- [5] NFACC. Code of Practice for the care and handling of pigs. 2014.
- [6] Dias et al. The brazilian pig industry can adopt european welfare standards: a critical analysis. *Ciência Rural.* 45 (2015) 1079-1086.
- [7] USDA. Overview of the United States Hog Industry. 2015.
- [8] FDA. Freedom of information summary - Improvest, (2011) 1-63.
- [9] Buhr et al. Comprehensive Economic Analysis of Improvest® Adoption by the US Pork Industry. 2013.
- [10] Vanhonacker & Verbeke. Consumer response to the possible use of a vaccine method to control boar taint v. physical piglet castration with anaesthesia: a quantitative study in four European countries. *Animal.* 5 (2011) 1107-1118.
- [11] Haberland et al. Efficiency of different selection strategies against boar taint in pigs. *Animal.* 8 (2013) 11-19.
- [12] Backus et al. Evaluation of producing and marketing entire male pigs, *NJAS - Wageningen J. Life Sci.* 76 (2014) 29-41.
- [13] Panella-Riera et al. Consumers' segmentation based on the acceptability of meat from entire male pigs with different boar taint levels in four European countries: France, Italy, Spain and United Kingdom, *Meat Sci.* 114 (2016) 137-145.

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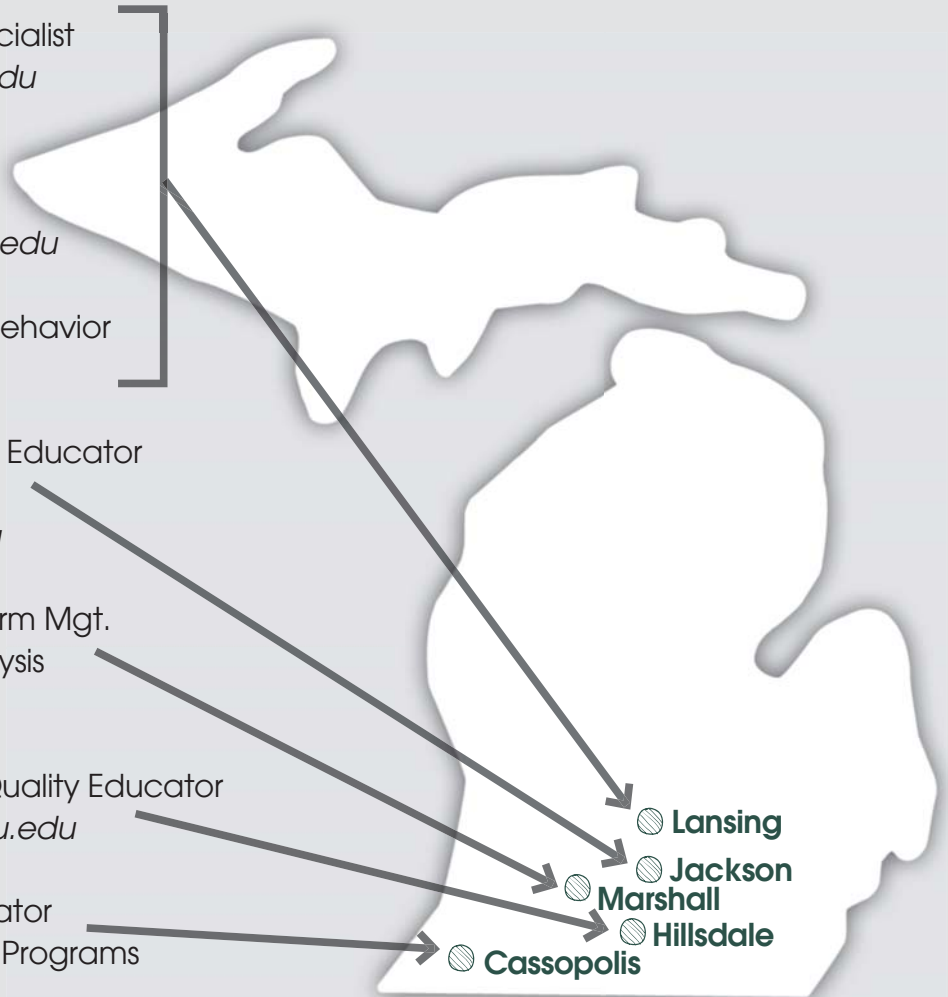
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