

Madonna E. Benjamin (nee Gemus)

**Madonna E. Benjamin, DVM, MS, DACAW**  
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Associate Professor, Swine Extension Veterinarian  
Department of Large Animal Clinical Sciences  
Michigan State University, East Lansing, MI 48824  
Appointment: 70% Extension; 20% Research; 5% Teaching; 5% Service

### **Education**

1. DVM 1990-1995 Doctorate of Veterinary Medicine College of Veterinary Medicine, Guelph, Ontario
2. MS 1995-1998 Master of Science and Residency, Michigan State University  
Major Area – Swine Welfare.
3. DACAW June 2022 Diplomate American College of Animal Welfare

Nationality	Canadian
Board of Veterinary Medicine – State of Michigan	6901007816
American Veterinary Medical Association member	304963

### **Professional Experience**

1. 2012 - Associate Professor, Swine Extension Veterinarian, Department of Large Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University, East Lansing Michigan
2. 2004-2012 Principal Veterinarian, Veterinary Science Consulting Inc. Millarville, Alberta.
3. 2006-2012 – Director of Swine Health, Verus Animal Health, Calgary, Alberta.
4. 2010-2018 Adjunct Professor University of Calgary Veterinary Medicine, Calgary, Alberta
5. 1998-2006 Swine Veterinarian Technical Consultant, Elanco Animal Health, Alberta
6. 1995-1998 Swine Production and Health Residency Program (conferred with MS), Department of Large Animal Clinical Sciences, Michigan State University, East Lansing Michigan.
7. 1995-1998 Veterinarian, Gemus Swine Veterinary Services, Maidstone, Ontario.
8. 1988 Provincial Director, Ontario Pork Producers Marketing Board, Etobicoke, ON
9. 1979-1989 Producer/Shareholder, Gerald Gemus and Sons Ltd, Oldcastle, ON.

### **Online Academic Profiles**

**Orcid; <https://orcid.org/my-orcid?orcid=0000-0001-9731-2139>**

### **Awards:**

**MSU 2022 Innovation of the Year Award.** For work in motion biometrics and artificial intelligence for improvement of animal health. **Benjamin M.E**, Morris D, Lavagnino M, Yik S. April 18, 2022.

### **Instruction**

#### **Graduate Student**

Bora Lee – MS. Chair – J. Siegford, Will Defend Spring 2023.

Veronica Polniak – M.S. Chair - D. Rozeboom, Will Defend Spring 2023.

### **Professional and Extension Service**

2021 - Review Panel Member: Canada Pork Council – [Swine Innovation Porc](#):

2021 - Chair - Care of Farm Animals Generally Accepted Agricultural and Management Practices (GAAMPS)

Madonna E. Benjamin (nee Gemus)

2021 - Swine Welfare Expert Panel – Pipestone Veterinary Services  
2020 - Michigan Secure Pork Supply Working Group and Taskforce  
2020-2022 Swine Euthanasia and Depopulation Task Force – National Pork Board  
2020 Member, North American Veterinary Licensing Examination. SME.  
2020 Grant Review Panel - USDA-NIFA  
2015 Common Swine Industry Audit Foundation Auditor  
2012- Pork Quality Assurance – State Trainer  
2013- Transport Quality Assurance – Advisor  
2015-2017 Professional Animal Auditor Certification – Swine  
2002-2012 Canadian Quality Assurance Program – Development Team and Trainer.

#### **Service - College of Veterinary Medicine**

2022 - CVM Committee on Reappointment, Promotion and Tenure (C-RPT)  
2019- VMC Clinical Ethics Committee.

#### **Professional Societies:**

2022 Member NC1211: Precision Management of Animals for Improved Care, Health, and Welfare of Livestock and Poultry.  
2020 – Review Editor in Precision Livestock Farming- Frontiers in Animal Science  
2016- American Veterinary Medical Association  
1995 - International Society for Applied Ethology  
1995- American Association of Swine Veterinarians

#### **Research and Creative activities**

##### **Active Research Grants:**

1. Co-PI United States Department of Agriculture. Morris D, **Benjamin M**, Brown-Brandl T, Rohrer G, Steibel J, Sharma S, and J. M. Siegford. \$598,000. An Automated Swine Phenotyping Tool to Advance Management, Research and Genetics.
2. PI MSU Technology Targeted Support Grants for Technology Development (TSGTD). **Benjamin M.E**, Morris D, Lavagnino M. \$30,000.00. Sow Welfare Management System - SIMKit Development. 8/1/2021-1/31/2022.
3. Co-PI United States Department of Agriculture. Steibel J, **Benjamin M. E**, Brown-Brandl T, Morris D, Dorea J, Norton T, Psota E, Rosa G, and J. M. Siegford. \$995,000.00. CIN: A Coordinated Innovation Network for Advancing Computer Vision in Precision Livestock Farming. 7/1/2021-6/31/2026.
4. Co-PD United States Department of Agriculture. IDEAS Grant. Siegford JM, **Benjamin, M. E.**, Rozeboom D, Thompson D. Johnson AK, Pairis-Garcia M and Steibel J. \$1,000,000.00. Understanding Precision Livestock Farming Adoption in the U.S. Swine Industry: Examining Needs, Perceptions, and Willingness to Pay of Users and Consumers. 6/1/2021 – 5/31/2026
5. Co-PI Michigan Alliance for Animal Agriculture. Zangaro, C. Ferry, B. Rozeboom, D. Millerick-May M, **Benjamin, M.** and Thompson, D. \$15,060. Strategies that Emphasize Management Over Medication in Extensive Swine Production. Submitted February 15, 2021.
6. PI Michigan Animal Health Fund. **Benjamin M.E**, Conklin T, Ferry E, Kramer S, Rozeboom D, Schweihofer J, Smith T, Collins C, Thompson D, Zangaro C, Abuelo A, and Buza M. \$10,000.00. The Cassandra Metaphor–Training for Michigan’s field partners in Enhanced Biosecurity and Preparedness for a Foreign Animal Disease Outbreak. 07/01/2020-02/15/2022.

Madonna E. Benjamin (nee Gemus)

7. PI. Michigan Translational Research and Commercialization. **Benjamin M.E**, Morris D, Lavagnino M. \$98,300. Phase II - Implement and evaluate biometric-based computer vision system for identifying individual livestock body conformation and locomotion patterns. 6/1/2020-5/30/2021.
8. PI Michigan Alliance for Animal Agriculture. **Benjamin M.E**, Song B, Thompson P, Lavagnino M, Ferry E, Thompson D. \$115,000. Development of low-cost biometrics of sow body composition and locomotion to improve individual sow health and welfare. 12/1/2018-10/31/20.
9. PI Michigan Animal Health Fund. **Benjamin M.E**, Thompson D, Rogers E, Conklin T, Ferry E, Rozeboom D. \$6,500. Small Farm Livestock Farmers' Training in Management. Animal Restraint and Mortality Humane Euthanasia, 08/18-07/31/20
10. Co-I National Pork Board. Vogel K, Ramirez A, Claus J, **Benjamin M.E**, Baysinger A, O'Brien B, Reyes, A. \$36,000 Foundational investigations of tissue dimensions and their relation to captive bolt application sites on cadaver heads from mature swine. 12/15/19-6/1/20
11. Co-I Michigan Alliance for Animal Agriculture. Ferry E, Guthrie T, Gould K, Metzger M, Conklin T, Williams Z, Thompson D, **Benjamin M.E**, Rozeboom D. Bacigalupo-Sanguesa P. \$22,000 Emergency Response Preparedness and Training Resources for First Responders for Accidents and/or Emergencies that Involve Livestock. 01/19-10/31/21.

#### **Funding Submitted (Not Recommended for Funding).**

1. PI Michigan Alliance for Animal Agriculture. **Benjamin, M.** Colbath, A. Chitwood, D. Lavagnino, M. Morris, D. Nielsen, B. Thompson, D. \$149,863. Improving animal welfare and management using low-cost computer vision for the detection of livestock lameness and body shape characteristics. Submitted February 15, 2021.

#### **Publications**

1. Qualitative Exploration of Precision Livestock Farming Perceptions of Key Stakeholders in the Swine Industry, Analysis of interview data using Q methods. Oral Presentation at the 2<sup>nd</sup> US Precision Livestock Farming Conference, May 21-24, 2023, Knoxville, TN. Akinyemi, BE, Vigers, B, Turner, SP, Akaichi, F, Benjamin, M, Johnson, AK, Pairis-Garcia, M, Rozeboom, D, Steibel, JP, Thompson, DP, Zangaro, C, Siegford, JM.
2. Progress report on the Coordinated Innovation Network for Advancing Computer Vision in Precision Livestock Farming. Abstract Presentation at the 2<sup>nd</sup> US Precision Livestock Farming Conference, May 21-24, 2023, Knoxville, TN. Juan Steibel JP, Brown-Brandt T, Rosa G, Siegford JM, Psota E, **Benjamin M**, Morris D, Dorea J.
3. Early Ethical Assessment – An Application to the Sustainability of Swine Body Scanners. 2021. Thompson PB, Thorp L, Ginsburg, BL, Zivku TM and **Benjamin ME**. Sustainability. DOI: [10.3390/su132414003](https://doi.org/10.3390/su132414003).
4. Relationship of tissue dimensions and three captive bolt placements on cadaver heads from mature swine (*Sus scrofa domestica*) > 200 kg body weight. 2021. Anderson KN, Allen KJ, Baysinger A, **Benjamin M**, Berger J, Claus JR, Greco BJ, Massie EA, O'Brien B, Ramirez A, Rendahl AK, Reyes A, Zhitnitskiy P and Vogel KD. Journal of Animal Science. DOI: [10.1093/jas/skab327](https://doi.org/10.1093/jas/skab327).
5. Pig welfare standards in the United States. Pairis-Garcia M, Baysinger A, **Benjamin M**, Eggers J, Jass C, Johnson A, Kaster C, Marchant-Forde J, Siegford J, Webb S, Yake-Strickland M. In: M. Pairis-Garcia (Editor). Audit Standards of Swine Production. Submitted for Review 03/30/2021.
6. Precision Livestock Farming and Technology in Swine Welfare. **Benjamin ME**. and Yik, S. (2021) In: T. Grandin (Editor) Improving Animal Welfare: A Practical Approach 3rd Edition, CABI Publishing, Oxfordshire, UK.

7. DIAT (Depth-Infrared Image Annotation Transfer) for Training a Depth-Based Pig-Pose Detector. S. Yik, **Benjamin ME**, Lavagnino M., Morris D., “in 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) October 25-29, 2020, Las Vegas, NV, USA (Virtual).
8. Precision Livestock Farming in Swine Welfare: A review for swine practitioners. **Madonna Benjamin** and Steven Yik. *Animals* **2019**, 9(4), 133; <https://doi.org/10.3390/ani9040133>
9. Porcine hemagglutinating encephalomyelitis virus and respiratory disease in exhibition swine, Michigan, USA. Lorbach, J. N., L. Wang, J. M Nolting, **M.E. Benjamin**, M. L Killian, Y. Zhang and A.S. Bowman. 2017. 2015. *Emerg. Infect. Dis.* 23:1168–1171. doi:10.3201/eid2307.170019.
10. Review: Effects of Ractopamine Hydrochloride (Paylean) on welfare indicators for market weight pigs. M. J. Ritter A. K. Johnson **M. E. Benjamin** S. N. Carr M. Ellis L. Faucitano T. Grandin J. L. Salak-Johnson D. U. Thomson C. Goldhawk. *Translational Animal Science*, Volume 1, Issue 4, 1 December 2017, Pages 533–558, <https://doi.org/10.2527/tas2017.0060>.
11. Transport losses in market weight pigs: A review of definitions, incidence, and economic impact. *The Professional Animal Scientist*. 25- 404-414 (2009); M. Ritter, M. Ellis, A. Johnson, **M. E. Benjamin**, P. DuBois, J. Marchant-Forde, A. Green, K. Pfalzgraf, P. Matzat, P. Mormede, T. Moyer, M. Siemens, J. Sterle, T. Whiting, B. Wolter.
12. Behavioural responses in finishing pigs fed Paylean In: *Proceedings of American Association of Swine Veterinarians*. Industrial Partners 2006: 123-126. **Benjamin, M.E.**; J. Brennan; G. Vessie; M.A Paradis; P. Dick [https://www.aasv.org/library/swineinfo/Content/AASV/2006/03Ind\\_Partners\\_3/123.pdf](https://www.aasv.org/library/swineinfo/Content/AASV/2006/03Ind_Partners_3/123.pdf)
13. Physiological responses of market hogs to different handling practices. In: *Proceedings of American Association of Swine Veterinarians*. 2002:399-400. Anderson, D.B., D.J. Ivers, **M.E. Benjamin**, H.W. Gonyou, L.F. Richardson, D.J. Jones, J.R. Wagner, R. Seneriz, D. Miller, K. McGuffey, T.A. Armstrong, D.H. Mowrey, L.E. Watkins, A.G. Zimmerman. <https://www.aasv.org/library/swineinfo/Content/AASV/2002/399.PDF>
14. Effect of animal handling method on the incidence of stress response in market swine in a model system. *Journal of Dairy Science*, 84(Supplement 1): 279(2001); **Benjamin M.E.**, H.W. Gonyou, D.J. Ivers, L.F. Richardson, D.J. Jones, J.R. Wagner, R. Seneriz, and D.B. Anderson
15. Human characteristics and handling strategies: their effects on the physiological and behavioural responses of juvenile pigs. In: *Proceedings of International Pig Veterinary Society* (July 1998); **Gemus ME**, Bartlett P.C., Nachreiner R.F. and Zanella A.J.
16. The Stockperson: Their influence on pig productivity and welfare. *Compendium Continuing Education for Practicing Veterinarians*; 20:1:22-29. 1998. **Gemus M.E.**

### Thesis

Human characteristics and handling strategies: their effects on the physiological and behavioural responses of juvenile pigs. *Masters Thesis*. Michigan State University, East Lansing, MI. (1998) **Gemus M.E.**, Bartlett P.C., Nachreiner R.F. and Zanella A.J. UMI Number 1392206.

### Conference Presentation and Proceedings

1. **Benjamin ME**. 2022 MiVetCon (MVC). DeVos Place in Grand Rapids, Michigan. October 8, 2022. Merging Precision Livestock Farming, Sustainability and Welfare in Livestock Production.
2. **Benjamin ME**, P. Bacigalupo Sanguesa, J. Schwehofer. International Beef Welfare Symposium. June 2022. Virtual Wet Lab on Humane Euthanasia Techniques for Beef Cattle. A new method of teaching, using video, Powerpoint platform, voice-over content, and animal simulators to train animal specialists in humane euthanasia.
3. **Benjamin ME**. Application of Animal Welfare Practice and Digital Technologies on Swine Farms. Virtual presentation through an online and onsite mode with translator to 1<sup>st</sup> International China-U.S. Swine Veterinarian Conference. April 28-30, 2022. Hangzhou, China. Co-organized by Chinese

Madonna E. Benjamin (nee Gemus)

Veterinary Medical Association, Western Institute for Food Safety & Security-UC Davis, U.S.-China Center for Animal Health-K State and Zhejiang International Science and Technology Cooperation Base for Veterinary Medicine and Health Management-China, hosted by Zhejiang A&F University, 6000 veterinarians in attendance.

4. **Benjamin ME.** 51<sup>st</sup> Annual Meeting February 27-March 1, 2021. *Practical Use of Precision Livestock Farming*. American Association of Swine Veterinarians Annual Meeting. Virtual. Practical Use of Precision Livestock Farming. Proceedings. Feb 27, 2021.  
[https://www.aasv.org/library/swineinfo/item.php?AASVPCS/2021/03-006\\_Benjamin.pdf](https://www.aasv.org/library/swineinfo/item.php?AASVPCS/2021/03-006_Benjamin.pdf)
5. **Benjamin, M. E.,** Johnson, A. K. 49<sup>th</sup> Annual Meeting March 3-6, 2018:08:005-006) *Precision livestock farming in swine production*. American Association of Swine Veterinarians Annual Meeting, Orlando, FL. [https://www.aasv.org/library/swineinfo/Content/AASVPCS/2018/08005\\_Benjamin.pdf](https://www.aasv.org/library/swineinfo/Content/AASVPCS/2018/08005_Benjamin.pdf)

#### **Publications and Presentations for Extension and Broader community 5 Years**

1. [Protect your pigs from verminous pneumonia](#). **M. Benjamin**, B. Ferry, D. Thompson. MSU-Extension News Website. Reach 3000. Available on-line as of Dec 2, 2022.
2. [Safe and proper method of using firearms to perform humane euthanasia on farms](#). Dairy Virtual Coffee Break Podcast. **M. Benjamin**. Host Marianne Murawski. Reach 64. Available on-line as of October 28, 2022.
3. [PQA Site Assessment and State PQA Advisor Training](#). C. Zangaro, D. Thompson, **M. Benjamin**. Reach 3000. Available on-line as of August 23, 2022.
4. [Vaccination Strategies for Pigs Raised on Small Farms](#). D. Thompson, **M. Benjamin**, Dan Brown (DVM) Four Star Veterinary Services. MSU-Extension News Website. Reach 3000. Available on-line as of June 8, 2022.
5. [MSU Extension ERAIL Response Trailer called into action for Livestock Rollover Accident in Lenawee County](#). T. Guthrie, E. Ferry, C. Zangaro, K. Gould, M. Metzger, P. Bacigalupo Sanguesa, **M. Benjamin**, D. Thompson. Entities associated with the placement of the ERAIL Response Trailer at the Liberty Township Fire Department includes Jackson County Office of Emergency Management; Jackson County Fire Chiefs; Jackson County Farm Bureau; Michigan Pork Producers Association; Michigan Alliance for Animal Agriculture (M-AAA); National Pork Board; MSU Extension. Article Available on-line as of June 15, 2022.
6. [Industry Collaboration Led by MSU Extension Focus on Preparedness for Michigan's Animal Agriculture Industry](#). Author: **MSU Animal Agriculture Extension Team**. MSU-Extension News Website. Reach 3000. Available on-line as of May 12, 2022.
7. [Management over Medication: Biosecurity Plans for Small Farms](#). C. Zangaro and **M. Benjamin**. MSU-Extension News Website. Reach 3000. Available on-line as February 14, 2022.
8. Early and Systematic Observations to Improve the Welfare of the Sick or Compromised Pig. Pork Information Gateway. November 18, 2021. Kramer SA and Benjamin ME.  
<https://porkgateway.org/resource/observations-to-improve-the-welfare-of-the-sick-or-compromised-pig/> Available on-line as of January 12, 2022.
9. [Protect your swine herd by washing and disinfecting vehicles returning from processing plants, buying stations and other farms](#). December 21, 2021. Thompson D. Ferry B, and **Benjamin M.**
10. [Simple biosecurity tips for your small swine farm](#). Zangaro C, Benjamin M. December 21, 2021.
11. [Update on Antimicrobials sold for use in pigs](#). December 9, 2021. D. Thompson, E. Ferry and **Benjamin M.**

12. [Madonna Benjamin is revolutionizing the livestock industry](#). Farmers Advance. April 2021.
13. [Can precision livestock farming help to optimize labor?](#) Mangual, M., **Benjamin, M. E.**, Thompson, David. (Accepted, 2021 February). *CANR news, Michigan Farmer News and Home Grown, Coldwater Press*.
14. Update: Progress Towards PRRSv-Resistant Pigs. Thompson D., and **Benjamin M.E.** (Accepted, 2020 December). *Michigan Pork Producers: Michigan Pork Quarterly*.
15. Disposal: What You Need to Know Seven days Before You Depopulate. *A guide for pork producers that are planning for the disposal of a large number of animals in the next 7 to 14 days. What immediate steps must be planned for if this process to occur?* Rozeboom, D., Ferry, E. A., Thompson, D., Fronczak, S., Rogers, E., Zangaro, C., **Benjamin, M. E.** (2020, May). Retrieved from [www.canr.msu.edu/outreach](http://www.canr.msu.edu/outreach)
16. Pork Industry Disruption Resources - COVID 19. *In partnership with Michigan State University Extension, Michigan Department of Agriculture and Rural Development and Michigan Pork Producers Association. Important information and resources for pork producers who are managing depopulation events caused by industry disruption from COVID-19 Pandemic.* Ferry, E. A., **Benjamin, M. E.**, Rozeboom, D., Rogers, E. M., Collins, C. (2020, May). Retrieved from <https://www.canr.msu.edu/outreach/> Rozeboom, D., **Benjamin, M. E.**, Ferry, E. (2020, July). Enhancing Business Continuity For Pork Operations Through Secure Pork Supply Planning. D. P. Thompson (Ed.), Retrieved from <https://www.canr.msu.edu/pork/index>
17. Planning tool for welfare culling during farm disrupted operations. [Planning tool for welfare culling during farm disrupted operations]. Buza, M. H., Bacigalupo Sanguesa, P., Abuelo Sebio, A., Rogers, E. M., **Benjamin, M. E.** (2020, May). In D. Rozeboom (Ed.), Retrieved from <https://www.canr.msu.edu/news/planning-tool-for-welfare-culling-during-farm-disrupted-operations>
18. Swine Welfare Culling and Depopulation. 2020. **Benjamin, M. E.**, Fate, S. D. Rozeboom (Ed.), T. R. Conklin (Ed.), *Animal Agriculture - Rapid Response*. Accepted. Ed. D. Rozeboom and T. Conklin.
19. When considering how best to prevent disease spread on-farm, what is good for the goose is good for the gander (and the pigs). Millerick-May, M., Zangaro, C., Ferry, E., Rozeboom, D., Thompson, D., **Benjamin, M. E.** (2020). Retrieved from <https://www.swineweb.com/when-considering-how-best-to-prevent-disease-spread-on-farm-what-is-good-for-the-goose-is-good-for-the-gander-and-the-pigs/>
20. Developing standard operating procedures for your swine facilities. Zangaro, C. A., Ferry, E. A., **Benjamin, M. E.** (2020, January). *MSU Extension Pork*.
21. What are Standard Operating Procedures, and why are they important to the swine industry. Zangaro, C. A., Ferry, E. A., **Benjamin, M. E.** (2020, January). *MSU Extension Pork*.
22. Precision livestock farming technology for remote monitoring of pig welfare and health: **Benjamin, M. E.**, Schneider, M. M. (2019, December). *Michigan Pork Quarterly* 24(4).
23. Sampling oral and processing fluids to identify disease in pigs. Thompson, D., **Benjamin, M. E.** (2019). Retrieved from <http://www.swineweb.com/sampling-oral-and-processing-fluids-to-identify-disease-in-pigs/>
24. Sampling oral and processing fluids to identify disease in pigs. Thompson, D., **Benjamin, M. E.** (2019, December). *MSU Extension - Pork*.
25. BlockChain and the PorkChain – A strategy for both producers and consumers. **Benjamin, M. E.**, Thompson, D. (2019, September). *MSU Extension Pork*.

Madonna E. Benjamin (nee Gemus)

26. Michigan's Pork Industry future: No more gestation stalls as of April 1, 2020. Rozeboom, D., Ferry, E. A., Swanson, J., **Benjamin, M. E.** (2019, January). *MSU Extension Pork*.

#### **Workshops and Presentations – 5 years**

1. Participant: Big Data and PLF Applications Workshop. March 13-17, 2023 Montevideo, Uruguay.
2. Participant: AVMA – Humane Endings Symposium. Jan 26-29, 2023. Chicago, Illinois.
3. **Benjamin, M. E.** [Predictive AI technology – how can it benefit sows?](#) Swine Health BlackBelt Podcast. Nov 16, 2022.
4. Ferry, E., Guthrie, T., Rozeboom, D., Zangaro, C., Thompson, D. Gould, K., Metzger, M., Green K., **Benjamin, M. E.** October 2022. *Emergency Response Training for Accidents Involving Livestock*. Michigan State Pavilion. MI.
5. **Benjamin M.** Trainer Training on an FAD Outbreak. October 20, 2022. *Water-Based Medium-Expansion Foam Depopulation Method in Swine*. Arden Shisler Center, Wooster, Ohio.
6. **Benjamin, M. E.** and Rozeboom, D. Status and future of Managing the Pork Industry – Breakfast discussion ANS 490/890 Independent Study. Feb 17, 2022. Dale Rozeboom, Moderator.
7. Coordinator: Pamela Ruegg, Phil Durst, Matt Smith, Mike Apley. Published October 26, 2021. Management over [Medication in Livestock Production Virtual Field Day](#). Practical strategies for responsible use of antimicrobials in food animals. Conceptualization, Planning and Organization: Thompson D and **Benjamin, ME**.
8. **Benjamin, M. E.** and Jeannine Schwehofer. August 2021. Humane Euthanasia of Livestock using Captive Bolt. Berrien County. Conceptualization, Planning and In-Person Presentation.
9. **Benjamin, M. E.** March 2022. Presentation to LCS on the role of Extension Veterinarian.
10. **Benjamin, M. E.** (January 19, 2021) *Operation Mainstreet - Veterinary*. Presented materials at Operation Main Street, SCAVMA. Purdue University Chapter.
11. Siegford, J. and **Benjamin, M.** Exploring the Future of Precision Livestock Farming. Published on Oct 7, 2020. <https://www.canr.msu.edu/videos/exploring-the-future-of-precision-livestock-farming>.
12. Brown-Brandl T. and **Benjamin M.** Emerging Approaches in Swine Precision Livestock Farming, Published on Oct 7, 2020. T. <https://www.canr.msu.edu/videos/emerging-approaches-in-swine-precision-livestock-farming>
13. Ferry, E., Guthrie, T., Rozeboom, D., Zangaro, C., Thompson, D. Gould, K., Metzger, M., Conklin T., **Benjamin, M. E.** September 23, 2019. *Emergency Response Training for Accidents Involving Livestock*. Michigan State Pavilion. MI.
14. Rozeboom, D., Ferry, E. A., Zangaro, C., Thompson, D., **Benjamin, M. E** (May 18, 2020). Biosecurity and Secure Pork Supply - *Swine Health Champions Upper Peninsula, Michigan*.
15. Thompson, D., **Benjamin, M. E.** (2019, April). Easy sampling for disease detection. *Swine Health Champions Upper Peninsula, Michigan*.
16. **Benjamin, M. E.** (2019, April). Sourcing antibiotics, vaccines and dewormers for the UP farm. *Swine Health Champions Upper Peninsula, Michigan*.
17. **Benjamin, M. E.** (February 11, 2019) *Operation Mainstreet Veterinary*. Presented other materials at Operation Main Street, SCAVMA.
18. **Benjamin, M. E.** (January 14, 2019) *Operation Mainstreet Veterinary*. Presented handout/power point at Operation Main Street, Food animal club - College Vet Med.
19. Rozeboom, D., Ferry, E. A., **Benjamin, M. E.** (2019, April). African swine fever is the UP at risk for infection. *Swine Health Champions Upper Peninsula, Michigan*.

Madonna E. Benjamin (nee Gemus)

20. Rozeboom, D., Ferry, E. A., Thompson, D. P., **Benjamin, M. E.** (January 8, 10, 15, 17, 2019) *African Swine Fever Update - Roadshow*. Presented handout/power point at MSU Swine Extension Roadshow, Michigan Pork Producers Association.
21. **Benjamin, M. E.** (2019, January). Vaccination programs for swine influenza. *Michigan Agricultural Fairs and Exhibitions*.
22. Woods, J. Ferry, E., Guthrie, T., Thompson, D. Gould, K., Metzger, M., Conklin T., **Benjamin, M. E.** *Livestock Truck Rollover Response Training*. May 13-14, 2018. Marshall Fair Grounds, MI.
23. Schwehofer, J., Conklin T., **Benjamin, M. E.** Livestock Euthanasia Training for Animal Agriculture Educators. In-service training Captive Bolt Gun and Firearms – Human procedures. January 2018. MSU-Meats Lab.