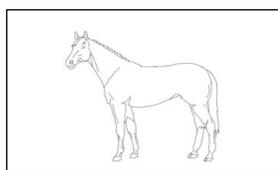
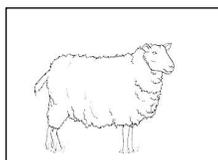
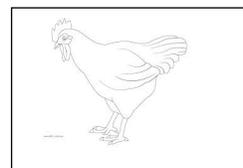
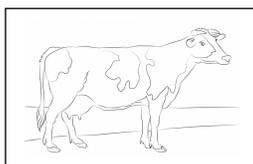
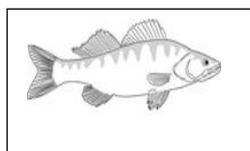
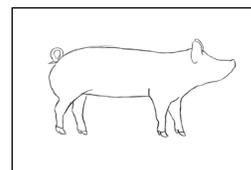


COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES ANIMAL FACILITIES RE-ENVISIONING COMMITTEE REPORT



July 2018 update of
May 2014 report



Committee Members:

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THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

Animal Facilities Re-envisioning Committee Recommendations on Animal Facilities for the College of Food, Agricultural and Environmental Sciences

July 2018 update of May 2014 report

Executive Summary

The College of Food, Agricultural, and Environmental Sciences (CFAES) commissioned an Animal Facilities Re-envisioning Committee to provide recommendations towards a plan and vision for 21st century animal facilities that enhance the research, teaching and outreach missions of the college. Animal agriculture is an important part of the >\$100 billion agricultural industry in Ohio and receipts for livestock and livestock products comprise significant part of the farm marketing's for Ohio. The state also ranks in the top 20 of most production classes of animal agriculture.

Ohio continues to be a leader in the production of agricultural animals and their associated products and CFAES has served this industry for many years. Animal facilities within CFAES are also critical for our research, teaching and outreach programs. The Department of Animal Sciences has the largest undergraduate enrollment within CFAES and live animals are part of the classroom experience. Departments within CFAES that utilize animals for research have generated \$44 million in grant dollars over the past decade and over 10,000 K-12 students and over 2,000 producers and industry affiliates have toured or attended workshops in CFAES facilities.

Many of the current animal facilities were constructed in the 1950's to 1980's and are past appropriate structural lifetimes and not consistent with today's production practices. Many of our facilities do not project an appearance that is consistent with the expectations of students, staff, faculty and stakeholders. Current conditions of many facilities impact the attitude of students, staff and faculty that must function in these buildings. Construction of new facilities or significant renovations will improve student recruitment and training; enhance faculty and staff morale; provide modern, functional and flexible facilities for outreach functions; enhance opportunities for new research and research funding; serve as a gateway for community education; enable compliance with current animal welfare standards; and enhance partnerships with animal commodity groups, industry and other stakeholders in the state of Ohio.

In this report, the committee makes nine recommendations for the college to consider as part of a 21st century plan to improve the animal facilities and programs within CFAES. These recommendations suggest a new vision to reduce duplication of facilities, relocation of some facilities closer to amenities (feed mill) and attempts to utilize appropriate land mass to accommodate new facilities. The recommendations are:

1. Make the Waterman Agricultural and Natural Resources Laboratory (WANRL) a site for a new multi-species animal (equine, poultry, swine, sheep & goat, beef cattle) facility that functions as a *Center for Teaching, Research and Outreach Excellence in Food and Animal Agriculture*. Relocate the equine program from Don Scott Field to WANRL with a new arena and associated facilities for horses. Maintain a smaller dairy herd in support of teaching, research and outreach priorities and provide the appropriate facilities for those programs.

2. Don Scott Field is envisioned as an excellent location to develop a collaborative program of excellence in forage management and heifer development for beef and dairy cattle. These activities could occur at Don Scott- however as University priorities related to Don Scott change, they could occur elsewhere. If they are to take place at Don Scott, this would require construction of a new cattle facility, relocation of the equine program to WANRL and the existing swine program moving to Wooster.

3. Wooster would become the site of a new CFAES Dairy and a new swine facility. This would place larger animal units in proximity to the new Wooster Feedstock Research Processing Facility that produces feeds for these herds.

4. Combine sheep flocks on Wooster Campus into one. Beef cattle would remain at Ohio State ATI Grace Drake Agricultural Laboratory (GDAL) and in the Wooster campus Feedlot Facility. A new cattle facility would be constructed at GDAL for this teaching herd and renovations to the feedlot facility are necessary to support a new research program in nutrient management. 2018 update: ATI disposed of their sheep flock and ATI students are working with our Animal Science/OARDC sheep. The new cattle facility at Grace Drake is underway – bids have been received and building will commence within the next several months.

The horse arena at GDAL would be expanded to provide classroom space and public seating for community related programs.

Poultry research would remain at the Wooster campus facilities with some renovation required.

5. Facilities at the Jackson and Eastern Agricultural Research Stations (EARS) will require renovations to continue research programs in cattle reproduction and forage management. The cattle herd at the North Appalachian Experimental Watershed located in Coshocton will be eliminated. The swine unit at the Western Agricultural Research Station will be eliminated once a new swine facility is completed in Wooster. 2018 update: Grow-Safe units have been installed for research at EARS and concrete work is pending for a major upgrade to the bull barn there to make it a suitable feedlot research center. The lambing barn has been upgraded with excellent outdoor concrete pens that can also house cattle on feed if necessary in the future. A small feedlot has been constructed at Jackson. The cattle herd at Coshocton has been eliminated.

6. The Food Animal Health Research Program and Department of Animal Sciences need specialized facilities for BSL2 work with animal pathogens. These facilities exist at Wooster but will need renovation to be sustainable. Architectural meetings are continuing for a research building being planned on Coffey Rd. This is a space that will have housing for biomedical animal research, and may be an opportunity for CFAES researchers interested in doing this type of work in Columbus to get animal space.

7. Aquaculture is the fastest-growing food industry in the world and Ohio ranks 1st in pounds of yellow perch sold, number of blue gill produced and 4th in sales of largemouth bass and bait fish in the United States. There is good potential for expansion of research, teaching and outreach programs in this area. Aquaculture facilities should be continued and renovated at South Centers in Piketon and at the William H. Schiermeier Olentangy River Wetland Research Park in Columbus.

8. Changes at WANRL in concert with new facilities at that location, and Wooster, are key drivers of this set of recommendations. Construction of the equine facilities and multispecies facilities at WANRL are the highest priorities. The next major projects are building the new swine and dairy facilities at Wooster. The other facilities recommended for construction or renovation should follow these priorities.

9. The Animal Re-envisioning Committee has presented a general roadmap that will become part of the CFAES strategic plan. The committee recognizes that the recommendations in this report are a starting point and may or will be modified through discussions with administration and stakeholders. Critical areas for continued committee discussion are land management relative to the recommendations in this report, consideration of financial aspects and development of a management model for the facilities.

The committee respectfully submits this report to the CFAES Dean and administration with the intent of assisting in moving the plan forward to promote research, teaching and outreach programs of excellence in animal agriculture.

Background. The College of Food, Agricultural, and Environmental Sciences Animal Facilities Re-envisioning Committee was asked to review current animal facilities within the College and to provide a roadmap and vision for 21st century animal facilities that enhance our teaching, research and outreach missions. An updated group, which included many members from the 2014 committee, was convened in July of 2018, to “refresh” the 2014 report. Animal agriculture is important to the economy of Ohio and the >\$100 billion agricultural industry. The total estimated value of all livestock in Ohio was approximately \$4.228 billion for 2017 (Table 1).

Table 1. Profile of Ohio Animal Agriculture 2017			
Class	Production or Inventory	Total Value	Rank in US
Poultry and Poultry Products			
Chicken layers, pullets, other	39,624,000	174,346,000	4
Chicken broilers	99,300,000	286,307,000	16
Eggs	8,903,800,000	479,638,000	3
Turkeys	6,700,000	181,352,000	9
Cattle and Calves			
Beef cows	1,300,000	1,404,000,000	
Milk cows	288,000	State level data no longer available	
Calf crop	262,000	“ “	
Milk produced lbs.	490,000	1,028,744,000	11
Hog and pigs			
	2,950,000	674,481,000	11
Sheep and lambs			
	117,000	State level not avail.	
Total		4,228,868,000	

Figures taken from the 2017-18 Ohio Department of Agriculture Annual Report and Statistics.

In addition, Ohio ranks in the top 20 of most production classes of animal agriculture (Table1). Thus, Ohio continues to be a leader in the production of agricultural animals and animal products and there is an expectation that CFAES continue to serve this industry through teaching, workforce training, research and outreach.

The Animal Facilities Re-envisioning Committee was given the primary charge to identify the essential mission driven teaching, research and outreach activities that define a comprehensive 21st century “one college” animal facilities program at The Ohio State University.

Teaching, Research and Outreach. The Department of Animal Sciences continues to lead the college in enrollment with nearly 650 undergraduate students and 40 graduate students enrolled. Live animals are used as part of the class experience for 38 different classes within the curriculum. Essentially, all students have contact with different species of animals

depending on their academic program. In addition, over 200 students are involved in co-curricular activities such as shows, livestock judging teams, employment and student organizations that require agricultural animals for these activities.

The availability of animals for instruction and practicums at the Agricultural Technical Institute (ATI) are also important. The Livestock (Beef/Sheep/Swine) AAS and AS degree programs had an average enrollment of 99 students (range 85-121) over the past five quarters. The Swine Production 1 course program enrollment averaged 12.6 (range 10-16) students for the past five quarters. Enrollment in the dairy program averaged 51 (range 38-58) in past quarters.

Curriculum changes with the conversion from quarters to semesters emphasize hands-on learning with animals as requested by students and stakeholders advising the departments on needs in the workforce thus putting more pressure on current facilities.

Research. Animals also serve an important niche in funded research projects within the College. Often the animal units are the field laboratories for conducting animal research. The Department of Animal Sciences and the Food Animal Health Research Programs are the two main grant generators for projects related to animals and animal disease. Research funding metrics for these two departments are summarized in Table 2.

These two departments have generated \$44.02 million in direct expenditures over the past 10 years with \$9.45 million in indirect costs to the College. Most funded projects used animals and animal facilities in these scientific endeavors. These projects also generated 1,258 journal articles and 200 graduate degrees.

Faculty members in these departments often lead interdisciplinary research projects in collaboration with the Colleges of Education and Human Ecology, Medicine, Engineering and Veterinary Medicine.

Outreach. The major outreach events using animal units include 4-H and other youth events, and continuing education to stakeholders. Tours of animal facilities, where permitted, are opportunities for educating consumers about the food systems and the role agricultural animals have in society. In 2010-2011, approximately 2,000 FFA and 4-H students, advisors and parents attended training sessions, fairs, and contests; 1500 youth, parents and teachers toured College animal units; and 750 stakeholders attended training sessions, organizational meetings and also toured the animal units. In addition to the Columbus units various K-12 events, field days and producer workshops are held at our outlying research stations that house animals.

Many of our facilities do not project an appearance of high quality, important or visible science occurring at the site. Current conditions of many facilities impact the attitude of students, staff and faculty that must function in these buildings. Construction of new facilities will improve student recruitment and training, enhance faculty and staff morale, provide modern, functional and flexible facilities for outreach functions, enhance opportunities for new research and research funding, serve as an opportunity for community education, enable compliance with current animal welfare standards and enhance a private-public partnership with animal commodities in the state of Ohio.

Table 2. Research Funding Metrics, 2007-2017

Department	Year	Direct Expenditures	F&A Expenditures	Journal Articles	Degrees Conferred
Animal Sciences					
	2007	\$2,281,802.00	\$233,537.00	53	12
	2008	\$2,071,829.00	\$371,429.00	60	12
	2009	\$2,102,508.00	\$326,721.00	50	16
	2010	\$1,741,865.00	\$393,795.00	51	14
	2011	\$1,769,148.00	\$351,174.00	58	9
	2012	\$1,814,306.00	\$363,002.00	77	17
	2013	\$1,637,311.00	\$261,017.00	90	17
	2014	\$1,455,014.00	\$205,825.00	92	10
	2015	\$1,355,656.00	\$203,419.00	70	9
	2016	\$1,321,245.00	\$189,891.00	91	14
	2017	\$1,429,621.00	\$213,748.00	91	16
Total		\$18,980,305.00	\$3,096,516.00	838	153
Average		\$1,725,482.00	\$281,501.00	76	14
Food Animal Health Research Program					
	2007	\$1,698,451.00	\$389,253.00	30	5
	2008	\$1,744,834.00	\$388,981.00	33	4
	2009	\$2,022,656.00	\$432,027.00	23	4
	2010	\$2,116,624.00	\$518,265.00	37	0
	2011	\$2,009,521.00	\$561,694.00	37	6
	2012	\$1,995,533.00	\$568,293.00	37	8
	2013	\$2,567,139.00	\$643,058.00	48	3
	2014	\$2,829,939.00	\$783,070.00	38	2
	2015	\$2,610,097.00	\$739,444.00	48	8
	2016	\$2,716,175.00	\$734,244.00	47	3
	2017	\$2,726,702.00	\$599,965.00	42	4
Total		\$25,037,622.00	\$6,358,294.00	420	47
Average		\$2,276,151.00	\$578,027.00	38	4

Process. During August, 2018 original committee members and several new additions were asked to refresh and update the 2014 recommendations.

Current Status of Animal Units. The College maintains animal units at several locations: Columbus (Waterman Agricultural and Natural Resources Laboratory – WANRL, poultry facility

near 4-H Center, Don Scott Field); Wooster campus (OARDC and ATI); Eastern, Jackson, and Western Agricultural Research Stations, the North Appalachian Experimental Watershed in Coshocton County and OSU South Centers at Piketon,. These facilities include those where animals are housed and associated facilities for storage of forage, feeds and equipment, and 89 such structures totaling 571,913 gross sq. ft. within the College facilities inventory. Most of the facilities at each location were constructed in the 1950s through the late 1980s and are beyond their structural lifespans. There are a few exceptions such as the Poultry Research Units in Wooster (1995); cattle handling facility at ATI (2013); Krauss Dairy dry cow barn (2003), Eastern ARS feedlot renovation (2004) and various hay, feed and manure storage facilities constructed within the last 10 years. There have also been extensive renovations to each of the three dairies at WANRL, OARDC and ATI and the swine units at Don Scott and Western Agricultural Research Station within the past 10 years.

A major challenge for each animal unit is the costly physical maintenance of aging facilities and the lack of updated production technologies in most facilities. Facilities in Columbus have been severely impacted by structural damage from recent wind and snow storms. Buildings housing sheep, swine, equine and dairy have been structurally reinforced to stabilize the structures and extend the useful life of these facilities. The wind damage has resulted in no horse arena in the equine unit, a structure critical to courses in equine handling. Also the beef unit is a hoop structure and not representative of industry expectations for research, teaching and outreach. The Ohio animal agriculture industry views our animal facilities as significantly inadequate and outdated. Therefore, the committee prepared the current report with the goal to replace most, if not all, current animal facilities with new structures.

In addition to the structural challenges of deteriorating animal units, the college also is challenged by the geographic dispersal of these facilities. The committee makes the recommendations that follows by site, regards for species of animal, proximity to faculty and students and available land resources.

Improvements and renovations to some animal facilities will need to be done in the transition from our current state to the construction of new facilities. For example, swine and poultry facilities require revised housing requirements based on the Ohio Livestock Care Standards.

Guiding principles and understanding the total infrastructure needs: Each facility will vary in functionality depending on the animal species housed in the structure and use for research, teaching and/or outreach. However, there are certain guiding principles and associated infrastructure needs to be considered in the future design of all facilities:

- Form follows function, facility designs are driven by the programmatic vision and needs of research, teaching and outreach as defined by academic departments that use animals in the three mission areas.
- Facilities will comply with AAALAC guidelines, including recommendations in the Federation of Animal Science Societies *Guide for the Care and Use of Agricultural Animals in Research and Teaching*. This includes providing the appropriate social environment and enrichment for each species of animal within each facility.

- Most facilities will have the capacity for public observations of animals; classrooms in appropriate facilities and observation decks/areas where animals can be viewed without contact and concerns for biosecurity.
- All facility entrances should be gated and an appropriate security mechanism for entry into the compound provided by using a card or punch key code.
- Recommended siting for facilities by this committee could change after consultation with planners, architects and/or engineers that have the expertise to evaluate building sites. However, the committee has given careful consideration to the need for these facilities to be located most conveniently for faculty, staff and students.
- No student housing is to be associated with new facilities suggested in this report.
- Facility designs should allow for flexibility to be used in research and teaching and accommodate the need for outreach and public activities.
- Facilities should incorporate into design the most advanced equipment, technology to reduce energy costs, and most efficient methods to handle nutrient management.
- Appropriate feeding and watering systems; these should be automatic to allow for monitoring of intake by individual animals.
- Fencing to allow access to grass and exercise.
- Shade for animals on pasture.
- Gating/heading for appropriate handling of animals for health treatments, sampling and separation where required.
- Carts or other equipment for movement of bulk and bagged feed and animals.
- Associated abattoir for processing of animals at end of life or end of use in research, teaching or outreach programs.
- Associated change rooms and showers for biosecurity protocols within the animal facilities and that allow caretakers, faculty and students to freshen after handling animals.

Recommendation #1. Waterman Agricultural and Natural Resources Laboratory

- WANRL consists of 261 acres and represents approximately one-half the remaining open spaces on the Columbus campus and provides the following advantages for location of agricultural animal facilities:
 - WANRL is in close proximity to the remainder of the Columbus campus,
 - Bus routes to this location can be arranged to transport students,
 - Provides proximity for faculty and graduate students for teaching and research,
 - The location provides high visibility for college activities in research, teaching and outreach for college personnel and the general public and demonstrates a rural/urban interface with animal agriculture. Therefore it is proposed to:
 - Establish WANRL as a primary site for the teaching of animal agriculture and set as a high priority for the college to create a *Center for Teaching, Research and Outreach Excellence in Food and Animal Agriculture*.
 - Consistent with past planning exercises in 1998 and 2004, construct a multi-species facility that provides animal quarters for beef, poultry, sheep and swine to meet curriculum needs for CFAES and possibly the College of Veterinary Medicine (CVM).
 - To accommodate the new multi-species facility, downsize to a small teaching and research dairy herd of 40-60 cows. Replacement heifers for the teaching herd can originate from animals at the Don Scott Field (see recommendation #2). The smaller milk volume from the reduced herd size may present issues in being able to sell the milk. Efforts will need to be made to find a local market for the milk either within the University or the community, and this may involve development of a milk processing facility on-site. It has also been suggested to upgrade technology at the dairy with installation of a robotic milking system and automated robotic feed pushers. The existing dairy facilities will need to be reconstructed on the current location or moved to a new location at Waterman.
 - Poultry currently housed in the one active poultry building near the 4-H Center would be moved to new housing in the multi-species facility and would be of approximately the same square footage. This would allow the current facility to be discontinued.
 - Move the equine program from Don Scott Field to WANRL with the construction of an appropriate arena and sufficient stables for animals used in the curriculum. Horses would be an acceptable species within the rural/urban interface and it puts the equine therapy riding program in proximity to the OSU Medical Center. Cooperation with the College of Veterinary Medicine at their Finley Farm as well as other possible options should also be investigated.
 - The construction of a multi-species facility and movement of the equine program to WANRL should also appeal to the clinical large animal programs in CVM. Development of a solid partnership with CM and CVM

will also give the college a firm anchor and economic support for utilization of WANRL as a Center of Excellence in Animal Agriculture.

- Issues at this location to be resolved are division of pasture space (among horses and forage production for dairy animals) and sheep and a nutrient management program that also accommodates ongoing crop and urban horticulture/landscape research of other departments and colleges at this location.

Recommendation #2. Don Scott Field

- Don Scott Field is a 502 acre site located in the northeast quadrant at the junction of Sawmill and West Case Roads, adjacent to the OSU Airport and other facilities. There is approximately 45-50 acres of pasture at this site located 6 miles from the main OSU campus. The distance from main campus is a major disadvantage to using this site for classroom instruction, as students must be transported to this location at an annual expense to the Department of Animal Sciences.
- Infrastructure exists for farrowing and nursery pigs, equine, and beef cattle. The beef research facility was destroyed in 2010 following structural damage from snow and a replacement hoop structure was erected in 2013. The roof of the equine arena was damaged in June 2012 and this building has been deconstructed and boarding of horses was eliminated at this site. Horses are still housed in a portion of the structure that was deemed structurally stable. Based on the above constraints, it is proposed that :
 - Don Scott Field is utilized as an excellent location to develop a collaborative program of excellence in forage management and utilization for heifer development in the beef and dairy industry. This collaborative program would provide information to the cattle industry on forage needs and development of first year female cattle for repopulating herds. This program would involve the Departments of Animal Sciences and Horticulture and Crop Sciences. These activities could occur at Don Scott- however as University priorities related to Don Scott change, they could occur elsewhere. If they are to take place at Don Scott, this would require construction of a new cattle facility.
 - The use of this site also creates a location for forage research in proximity to the main campus, as most research is now done at the Agricultural Research Stations that are several miles from main campus.
 - Construct a new facility and associated infrastructure for the heifer development program. These facilities should integrate with the Master Plan for the OSU airport, and likely be placed on the eastern or northern side of Don Scott. They may include facilities for reproduction research and pens for finishing cattle.
 - To accommodate the change in use of Don Scott Field the equine program will relocate to WANRL. Once new facilities are available the current equine and swine facilities at Don Scott would be deconstructed. Swine program and facilities at Don Scott will be discontinued and buildings deconstructed. A new

swine complex will be constructed at Wooster (recommendation #3) or another location as negotiated with private industry partners.

- The recommendation of the 2018 group is to try to be as flexible in our investment at Don Scott as we can, so as to be able to accommodate possible future changes/mandates given by the OSU airport and/or the Federal Aviation Administration.
- As of the date of this update (October, 2018) CFAES has moved forward with plans to sell the Case Road property adjacent to Don Scott Field, which houses sheep and small ruminant teaching and research. This will necessitate short-term contingency plans and long-term permanent plans to relocate these species for effective use in animal-based teaching, research and outreach missions. This is a significantly high priority, as small ruminants are of a size that many of our students from non-rural backgrounds can learn to handle safely.

Recommendation #3. Wooster (OARDC and ATI)

- OARDC and ATI will function as “one college/one campus” concept related to animal facilities at Wooster.
- The main impact on the Wooster campus is the relocation of the larger production herds for the College on land operated by OARDC and ATI. The justification for this recommendation is based on the following:
 - Larger land masses at OARDC and ATI for relocation of dairy and swine units. These larger animal units are not suitable for a rural/urban interface at WANRL, but are suitable in a rural area.
 - More land available for nutrient management.
 - Proximity of these herds to the Feedstock Processing Research Facility (feed mill) that produces standard and experimental feeds for the animal herds at the various locations. Location of the majority of grain consuming animals near Wooster will substantially reduce transportation and maintenance costs for delivering bulk and bagged feed to Columbus and the Western Agricultural Research Station.
 - Availability of personnel for operation of the dairy, need to establish caretakers for swine unit.
 - Student housing is available for students during the Maymester and summer at the ATI Applewood Village, to accommodate undergraduate and graduate students who may work on research or other projects involving the dairy or swine herds.
- Construct a new College dairy with capacity for 500 cows (300 lactating, 50 dry and 280-300 replacements) to replace the dairy at WANRL, ATI and portions of the Krauss Dairy facilities. Suggest that the new dairy be sited near the current Krauss Dairy if possible. This dairy will be the major college dairy for research, teaching and outreach. There are some issues with available land for forage, requiring shipment of forage to this herd and there may be animal welfare requirements in future that require cows to have

access to dry lot or pasture for period of time. These issues will need to be weighed into the discussion.

- Deconstruct ATI (possible consideration for repurposing ATI as a heifer facility) and portions of the Krauss Dairy complex.
- ATI will eliminate their sheep flock and use sheep in the OARDC flock as of July 1, 2014. Sheep facility has been renovated and is adequate for next several years. ATI disposed of their sheep flock and ATI students are working with our Animal Science/OARDC sheep.
- ATI will maintain a beef herd of 125-175 cows at Grace Drake Agricultural Laboratory (GDAL). This will require the deconstruction of the current beef cattle facility and construction of a new facility near the beef cattle handling facility. The new cattle facility at Grace Drake is underway – bids have been received and building will commence within the next several months.
- ATI will construct a facility (or utilize a renovated Animal Sciences Wooster beef/sheep facility) to maintain a small goat teaching herd at GDAL. Goats have been introduced to the Columbus-based small ruminant facilities as of 2016, and will be affected by the sale of the Case Road property. The facility being used is inadequate and this needs to be addressed. A recommendation here is to possibly combine with the OARDC sheep program.
- Construct new swine facilities within the Wooster Campus, this will be a farrow to finish facility of approximately 150 sows. This herd will provide animals for the teaching programs at Columbus and Wooster and for research programs in the college and Food Animal Health Research Program. Alternatively, current discussion with private industry partners could provide a larger commercial unit at a different location. New modular facilities have been put in place: 1.) Gestation building and 2.) Farrowing/nursery building to meet the immediate needs for ATI swine teaching. Extensive effort was undertaken to develop a public-private partnership for the construction of farrow to wean swine facility in the Wooster area to support teaching, applied research, and employee training efforts. This effort was determined at the university level to be not feasible due to potential legal concerns; however, further investigation of options for public-private relationships should strongly be considered. If discussions with possible private industry partners do not generate results, strong consideration should be given to the construction of teaching and research facilities to accommodate a 250-300 sows farrow to finish operation.
- Expand current horse arena at ATI to allow for classroom and seating. The arena can then function as a multi-species classroom and multi-purpose facility to meet the curriculum needs of students at ATI.
- OARDC does not maintain a beef cattle herd at Wooster, but does have a feedlot research facility constructed in 1964. This facility is ideal for nutrition studies due to 24 group pens and 80 individual pens that allow for sufficient experimental replicates. However, the facility was built over manure pits and is not conducive to nutrient management research. Improvements in this facility are needed for animal comfort and well-being to reduce issues with lameness in cattle housed in this structure.

- The beef feeding area on the north side of the facility is currently being converted into space for sheep research to better utilize the space and reduce the need for investment in housing to more appropriately accommodate beef cattle and the necessary installment of a new beef feed delivery system.
- It is anticipated that the beef feedlot facility being constructed at ATI will have some research capacity.
- Maintain current poultry research facilities constructed in the 1990s. These facilities are in very good condition and have been recently renovated with new caging for turkeys and chickens. Laboratories in these facilities need to be modernized (replace wooden cabinets and fixtures) to allow initial sample processing on site.
- The Poultry Service Building constructed in 1928 at Wooster will need to be deconstructed at some time and either a new facility constructed to house current flocks of poultry with specific genetic traits or the flocks relocated to the Poultry Research buildings.

Recommendation #4. Agricultural Research Stations

- Deconstruct swine facilities at Western Agricultural Research Stations, once new facilities are constructed at GDLL or alternative location. Until this occurs, we need to continue to utilize these facilities to reduce pressure on the Don Scott swine facilities.
- Phase out bovine herd at North Appalachian Experimental Watershed. Some cattle with better genetics moved to the herds at the Jackson and Eastern Agricultural Research Stations. These animals will replace culled animals in the station herds. This process will be completed by fall 2014. 2018 update: this has been accomplished.
- Maintain current beef herds at the Jackson and Eastern Agricultural Research Stations. The closing of the cattle herd at Coshocton and prior closing of the herd at the Southern Agricultural Research Station results in a reduction of beef cattle from 744 to 544 a 27% reduction. 2018 update: this has been accomplished.
- Some cattle facilities at both Jackson and Eastern have been recently renovated and remain in very good condition. There is a need for a new cattle barn at Jackson and an addition to the shop/storage space at Eastern Unit 2 that will replace space lost from deconstructing older obsolete barns. Better ventilation improvements in barns and incremental renovations will continue.

Recommendation #5. Specialized facilities

- There are five specialized buildings (NIH, Gnotobiotic Laboratory, Swine Isolation, Animal Health Isolation, and Avian Disease) that are part of the Food Animal Health Research Program complex at Wooster. Faculty in Animal Sciences is beginning to increase their involvement in experiments requiring BSL2 facilities.
- Each of these structures was built in the early 1950s and is considered to be in fair to adequate condition.
 - These buildings are in need of general reconditioning of the floors, walls, windows, HVAC, new environmental controls, plumbing and electrical services. The exception is the Avian Disease Laboratory that needs to be deconstructed

and replaced with a new building designed for BSL2 experiments. There may be an opportunity for Specific Pathogen Free flock use/research. It has been recommended to explore the possibility to raise and house these animals.

- The Ralph Regula Plant and Animal Agrosecurity Research Facility completed in 2012 is in excellent condition and can be used for both BSL2 and BSL3 level experiments.

Recommendation #6. Aquaculture

Aquaculture in the North Central region of the U.S. is unique in comparison to the South or Coastal regions due to the specific climatic conditions, surface water resources availability, presence of Great Lakes (sport fishery) and large metropolitan areas as potential markets. Research, outreach and demonstration facilities at Ohio State should reflect both general trend in promoting consumption of fish as healthy food and tradition of local communities regarding fish species consumed and other needs such as recreational fishery and conservation of unique aquatic fauna.

The priority fish species to be subjected to domestication and intensification of production in Ohio's aquaculture industry remain to be defined. The major ingredients for aquafeeds, constituting 50% of aquaculture production costs, will weigh heavily in this definition. Ohio aquaculture will benefit from production of major Ohio crops (soybean), and by-products of poultry (feather meal), swine and dairy production (blood, meat and bone meal) industries as ingredients of aquafeeds.

Thus, the aquaculture industry has potential for future growth in Ohio and will need associated research, teaching, workforce development and outreach functions provided by the college. Therefore, the committee proposes:

- Two sites be maintained for aquaculture research, teaching and outreach: South Centers

Research and Extension Center at Piketon, Ohio, and a new aquaculture/aquaponics facility (building 3) in Controlled Environment Food Production Complex at Waterman Farm on the Columbus campus.

- Piketon facilities were constructed in 1991 and need updated filters, environmental control and piping to support research on a variety of species. Also, there is an urgent need for upgrades in the aquaculture breeding center barn including filters, environmental controls, emergency power backup and a recirculating aquaculture system (consultation with Piketon staff needed).

- There is a need for additional aquaculture infrastructure at the new Waterman Farm facility to accommodate the use of live aquatic vertebrates in the CFAES curriculum and to reach a unique urban community through outreach and demonstration of state-of-the-art aquaculture facilities. This should include interests of sport fish community throughout Ohio and research and outreach will concentrate on recreational fish species in collaboration with Ohio Division of Wildlife, ODNR.

- Future expansion of Waterman Farm aquaculture teaching and outreach facilities within the college should be targeted to this site due to proximity to main campus and the urban

community. This site would primarily be for state-of-the- art research, teaching and outreach, with potential for internships and undergraduate research projects.

Recommendation #7. Proposed order of procession with facilities.

Changes at WANRL in concert with new facilities at this location and Wooster are the key drivers in this plan. Therefore the following priorities are suggested in descending order. These priorities can change as details are developed in discussions with planner/architect or if funding streams are available for other projects listed below.

1. Construction of the proposed multi-species facility at Waterman is proposed first, which should include an arena for equine and other species use. It should be recognized that the equine program is a significant part of the Department of Animal Sciences teaching program. Advantages are:
 - a. The arena will serve as a focal point for the new plan and would serve both teaching and Extension needs.
 - b. It would also provide a location to attract potential donors, and provide a space for new outreach activities (4-H groups, alumni at football games, medicine and veterinary medicine).
 - c. It allows the equine therapy riding program to be in proximity to the OSU Medical Center.
 - d. It is important to note that the multi-species facility will encompass equine housing, swine housing, poultry housing, small ruminant, and beef cattle facilities to complete superior teaching opportunities plus the classroom and lab space to allow for excellence in teaching.
 - e. The existing dairy facilities will need to be reconstructed on the current location or moved to a new location at Waterman.
2. Construction of the multi-species classrooms to include classrooms and wet laboratory space to support the teaching activities within this facility.
3. Construction of dairy at Wooster to allow for reduction of dairy at WANL and deconstruction of associated buildings to allow for construction of the multi-species building.
4. Construction of the new swine facilities on the Wooster campus or alternative location determined by collaboration with industry. Deconstruction of swine facilities at Don Scott and Western Agricultural Research Station.
5. Construction of new beef facilities at Grace Drake (this is currently underway as of July, 2018) and Don Scott Field
6. Renovation of feedlot beef facilities at Beef and Sheep Research Farm in Wooster (this is currently underway as of July, 2018).
7. Renovation or replacement of BSL2 facilities for Food Animal Health Research Program and Animal Sciences.
8. Construction of new aquaculture facilities at Waterman (likely in the Controlled Environment Greenhouse) and renovations of the Piketon facilities.
9. Replacement of Columbus poultry facilities.

10. Construction of replacement facilities or renovations at Jackson and Eastern Agricultural Research Stations. 2018 update: these replacements and renovations have been completed.

As new construction is completed follow committee recommendations on deconstruction of older facilities as per above recommendations.

Recommendation #9. Next phases

- Discussion and recommendation of College management models for the animal facilities at both the Columbus and Wooster locations. The Animal Sciences Department has hired a Director of Farm Operations (Julie Morris), who started to work in this position on June 1, 2018.
- Continue to work towards collaboration/combination of Animal Sciences/Wooster Campus animal facilities.
- Further engage CVM in conversations related to the multi-species building at WANRL. Most of the agricultural animals used in research and teaching are housed at the Finley Farm. CVM is interested in having the opportunity to partner with the CFAES in using animals – particularly horses - in the multi-species facility.
- Engage Ohio animal agriculture organizations in conversation with this plan.
- Develop additional detail for proposed facility recommendations in the current report preferably with the counsel of a planner or architect with experience in the design of animal facilities.
- CFAES has made the decision to seek Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) accreditation for all College animal facilities, beginning in 2019.
- As plans for the Waterman Multi-Species Animal Facility move forward, it is important to identify a facility somewhere near Columbus to house herd/flock animals, which we can utilize to rotate/move into and out of the Waterman facility. This will require sufficient transportation capabilities and the attention of an employee dedicated to handling the logistics/scheduling required.
- In the CFAES Master Plan, the current Animal Science building is listed as the “next” building slated for replacement. That building houses a meat lab - an abattoir is a necessary requirement for the Animal Sciences department programs (Meat Science, carcass evaluation of research studies). It is presumed that this would continue to be located in the Animal Sciences building or in new facilities at the Waterman Farm.

2014 Process:

An 18 member committee composed of faculty, animal facilities managers, and administration began meeting in October 2013, convening at approximately two week intervals and held a half-day retreat in December 2013. In addition, separate reports were generated by committee members for beef cattle and sheep, dairy, equine, poultry, aquaculture and animal disease research facilities. The committee chair took input from other faculty in the Department of Animal Sciences and ATI, that utilize animals but were not committee members. Some faculty also toured animal facilities at Colorado State and Iowa State Universities. Facilities at Findlay, Michigan State and North Carolina State University are still desired future sites to visit.

Members of 2014 committee, not involved in the 2018 report:

Kyle Culp, Instructor, Department of Animal Sciences; Craig Fendrick, Agricultural Administration, Waterman Farm; Francis Fluharty, Research Professor, Department of Animal Sciences; Gregg Fogle, Manager Beef Unit, Department of Animal Sciences; Wesley Green, Professor, ATI; Ron Kensinger, Professor, Department of Animal Sciences; Jeff LeJeune, Director, Food Animal Health Research Program; Lynn McCready, Director Olentangy Wetlands, Research Park, School of Environmental and Natural Resources; Steve Neal, Assistant Dean, CFAES; Mark Sulc, Professor, Department of Horticulture and Crop Sciences; Hanping Wang, Associate Professor, Aquaculture Program, South Centers, Piketon; Henry Zerby, Chair, Department of Animal Sciences;