

UNIVERSITY OF ALASKA AIRBANKS

Special Program Review

UAF Farms and Large Animal Care



Abstract

UAF has been engaged in agricultural teaching and research since its inception in 1917 as the Alaska Agricultural College and School of Mines. The College site was selected in part to enable co-location with the Fairbanks federal agriculture experiment station established in 1906. The Fairbanks Experiment Station and the Matanuska Experiment Farm were transferred to the college in 1931. Over the years, UAF animal research has broadened such that today UAF operates several facilities for agricultural and animal research. This committee was charged by Chancellor Rogers to perform a special program review of the four main facilities to consider whether there are additional possibilities for achieving savings. We believe that UAF would be best served if large animal research and education continues at some level, therefore seeking creative solutions to the strategic use of the reduced funding available for underwriting this enterprise.

Definitions

Inventory maps for each of the facilities involved in this report have been provided by Facility Services and are available on the special review Web site (<http://www.uaf.edu/finserv/omb/uaf-programreviews>).

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| LARS | Robert G. White Large Animal Research Station comprised of herds of reindeer, caribou, and muskoxen located off Yankovich Road in Fairbanks, Alaska. |
| BRAF | Biological Reserve Animal Facility located on UAF North Campus (north of the ski trails) focuses on naturalistic housing of research animals and has periodically been used as a quarantine facility. |
| FEF | Fairbanks Experiment Farm comprised of the agricultural reindeer facilities Georgeson Botanical Garden, and the field between West Tanana Drive, Parks Highway, and Geist Road. The T-Field, and several buildings on the north side of West Tanana Drive. |
| IOHF* | Irving 1 Animal Facility will be decommissioned and repurposed in February 2015. All indoor components of this animal facility have been relocated to BiRD. The outdoor pens and runs at the north end of the Irving 1 facility are to be demolished in summer 2015 but a location for their replacement has not yet been determined. |
| MEF | Matanuska Experiment Farm comprised of greenhouses, agricultural fields and forest lands, a small herd of cattle, fully equipped soil and plant analysis laboratory, two classrooms with distance delivery capabilities, located near Palmer, Alaska. |
| DJFRS | Delta Junction Field Research Site comprised of agricultural fields and forest lands located near Delta Junction, Alaska. |

* Irving I and the BiRD animal facilities are not part of this review.



Bottom Line Up Front

Under the assumption that UAF wants to continue large animal related research and educational activities, this committee found no actions that would at once preserve our capacity and realize significant cost savings for the next fiscal year. Instead, we found ways to potentially increase revenue or decrease operating costs over a longer time frame.

UAF should invest in LARS for the future as it is our most advanced large animal care facility. It is used in research, outreach and education, including our new professional veterinary medicine program.

UAF Animal Facilities should be managed to provide services and access for multiple researchers and programs. Our animal care program is centralized but management of many of our facilities continues to be decentralized and independent. No permanent UAF animal facility should be managed by an individual.



Recommendations Summarized by Facility



ducks, geese, various passerines, rodents, fox, and bears. More importantly, proper sanitation of the facility requires direct access to utilities such as water, electrical, and sewage. There are plans to remove the existing outdoor holding areas as part of the BOR approved West Ridge Deferred Maintenance Plan. The facility needs to be rebuilt with one that meets requirements for proper animal care. The optimal location requires further consideration.

Recommendation: Go forward with existing plans to relocate the outdoor holding areas with an open design that is sufficiently flexible to accommodate different projects and different users. There is not a consensus in the committee on the issue of where to build this, but there is a consensus that we need to build it. We leave the new building until



- v. The PI for the Reindeer Research Program manages the herd at the FEF and also works with the reindeer herders in Northwest Alaska. The Reindeer herders, including some Alaska Native herders, were contacted by the PI and told the Program was being cut. Although somewhat misguided, it did raise



Research projects involve UAF graduate and undergraduate students, UAF faculty, research associates, visiting scientists, and interns. Research emphasis includes studies on

- comparative nutritional and reproductive physiology
- endocrine and physiological controls
- behavior and energetics
- genetics and disease
- Pasture and grazing management

Other considerations:

Because we have LARS, we have the ability to conduct research with arctic ungulates including muskoxen and reindeer. This facility also provides significant community good will and tourist interest through tours and qiviut production and sales. Undergraduate and graduate teaching and research opportunities in large animal restraint, examination, and treatment techniques at UAF can only be taught using the facilities and equipment currently present at LARS. To accommodate changing program directions, particularly for Veterinary Medicine, animal populations may need some manipulation to include 10 of each of the more common domestic large animal species, such as 10 cows, 10 sheep and five horses.

Without LARS we would lose not only our ability to do nutritional or reproductive research on muskoxen and reindeer, but the public outreach and community goodwill provided by this facility would be lost as well.

BRAF

Purpose: The Biological Reserve Animal Facility is a multi-use, multiuser facility to provide for naturalistic housing of a wide variety of species. The BRAF allows us to study animals in a



Location at edge of UAF main campus provides unique, easy, and quick access for UAF researchers and instructors. Allows classes to do field trips within time frame of class period.

Ideally suited for small plot, intensive research on agronomic and horticultural crops.

Longest continuous weather data in Alaska.

Home to only university operated research reindeer herd in North America that is capable of meat quality and marketing studies providing unique opportunities for herd health and production research. The university does NOT own the reindeer herd.

Home of the Georgeson Botanical Garden, the only subarctic botanical garden in North America and one of the most visited locales in the Fairbanks area. It was ranked among 50 Most Stunning University Gardens and Arboreta in the World

(<http://www.bestmastersprograms.org/moststunninguniversityarboretumsandgardens/>).

Only tree-ring laboratory in Alaska, one of few fully equipped tree-ring preparation laboratories in U.S.

Home to four outdoor kilns used by art classes for firing pottery. Only outdoor, university owned kilns in Alaska.

Other considerations:

Elimination of the FEF would eliminate the possibility of:

Study of climate change effects on agriculture going forward by use of the longest maintained weather data in a single agricultural location in Alaska.

Severely limit small plot studies of grains and oil seed crops applicable to Alaska (see Aurora magazine, 2009, volume 1, issue 2) severely limit breeding of new crops.

Potential elimination of Georgeson Botanical Garden, one of the most visited sites in Fairbanks and source of UAF outreach aimed at all ages.

Limit forestry research including tree ring research and forest regeneration studies,

Limit access of UAF art students to modern, unique kilns for various ceramic firing techniques.

Open fields needed for various kinds of research needing close proximity to campus (e.g. some atmospheric research, long term songbird nesting monitoring).

Loss of controlled environment facility for studying plant physiology.



and veterinary medicine programs will already be using LARS as their main facility, so it will have minimal impact on these programs.

The FEF animal facility could support large scale controlled reproduction and nutritional studies if easier access were granted to collaborating scientists. Animals from FEF could also serve as a on practice for Veterinary Medical students, allowing fresh animals to the existing LARS herds and rest period for heavily used animals. Movement of animals between the facilities could only occur if the concerns regarding radiation contamination are satisfied. Further, as animals from FEF went to slaughter, students could follow the slaughter process through the USDA inspected slaughter facilities at North Pole or Delta Junction. As such, animals from this facility would also be used for Veterinary Medical students to learn about slaughtering techniques and practices important in the study of meat inspection.

Without this facility large scale reindeer research would have to be done at LARS with an increase in animal numbers there. Slaughter practices would have to be moved elsewhere.

MEF

Purpose: Provides a site for research, especially in agricultural, forestry, and ecological research especially applicable to the Mat-Su Valley and surrounding areas, support teaching (both local and distance), and engage in outreach in agriculture, forestry, you



This facility is too far from Fairbanks to act as the main facility to provide equipment and animals for teaching large animal restraint, examination and treatment techniques but it could act as a feeder source of animals for LARS. In this way sustainable herds of cattle, sheep, and goats could be maintained rather inexpensively in Palmer and then shipped as needed to LARS, keeping the number maintained at LARS to only that needed at the moment for teaching and research purposes. This station is also the only facility we h



Lowest cost agricultural research facility in Alaska.

Other considerations:

Elimination of the Delta Junction Field Research Site would:

Eliminate large plot cereal grain and oil seed research under conditions in which crops are being produced in Upper Tanana Valley Alaska.

Eliminate irrigation research in the driest agricultural region of Alaska with application for Yukon Territory, Canada.

Base for numerous UAF research studies in the Upper Tanana Valley area.

Loss of visibility and





Appendix A: Research



Fedorov, V. B., Goropashnaya, A. V., Toien, O., Stewart, N. C., Chang, C., Wang, H., et al.
(20



Remote sensing (use of reflectors for satellite calibration)

Grad students:

Megan Lene (M.S., dropped out): Phosphorus and potassium fertilizer rates for Alaska crops.

Publications Based on Research Conducted at Facility

Journal Articles

Pantoja, Alberto, Derek S. Sikes, Aaron M. Hagerty, Susan Y. Emmert, and Silvia I. Rondon. "Ground beetle (Coleoptera: Carabidae) assemblages in the Conservation Reserve Program crop rotation systems in interior Alaska." *Journal of the Entomological Society of British Columbia* 110 (2014): 618.

Sparrow, S.D., Zhang, M., Masiak, d.t. , and Van Veldhuizen, R.. 2014. Harvest and Nitrogen Management of Tall Perennial Grasses as Biomass Feedstock in Subarctic Alaska. *Alaska* 67 (3): 388-395.

Fielding, Dennis J., Ellen Trainor, and Mingchu Zhang. "Diet influences rates of carbon and nitrogen mineralization from decomposing grasshopper frass and cadaver." *Soil Biology and Fertility of Soils* 49, no. 5 (2013): 537-544.



moss and roots of conifer and willow in forests of the Pacific Northwest of North America." *Canadian Entomologist* 144, no. 04 (2012): 55-576

Zhao, Aiqin, Mingchu Zhang, 2012. Size fraction of soil water soluble organic C and N under different land uses in Alaska. *Soil Sci.* 177:669-684. Fbks, Delta and Palmer

Zhao, Aiqin, Mingchu Zhang, 2012. Spectroscopic characteristics and biodegradability of soil cold and hot water extractable organic matter under different land uses in Alaska. *Comm. Soil Sce. And Plant Anal.* 44:303-3048 Fbks, Delta and Palmer

Conn, J.S., Werdin Pfisterer, N.R., Beattie, K.A. 2011. Development of the Alaskan ragweed flora 1984-2004: a case for prevention. *Weed Research.* 51(1):63





High tunnel and season extension research
Forage grasses and haylage trials
Long-term ecological monitoring of birch trees (Feld), part of Generation OnTree, a citizen science project.
Long-term weather/climate data collection (among oldest continuous data sets in AK).
Tree-ring analysis (TreeRing laboratory is located at Farm)

GI

Winter-time atmospheric boundary layer turbulence and dynamics
Climatological Research
Permafrost Research
Remote sensing (use of reflectors for satellite calibration)

IAB

Poplar province plantation at Field

INE

Other (nonUAF)

Alaska Songbird Institute (long-term swallow nesting monitoring important to determine climate change impacts on bird nesting behavior)

Wildlife Society (Kestrel nesting)

U.S.D.A. Agricultural Research Service (closed in 2012)

Weed and Herbicide Research (Seefeldt)

Long Term Weed Research (Conn)

Entomology Research (Grasshopper management, agricultural insect pest biology)

Soil Leaching Research (Seefeldt/Schnabel)

Graduate Students (recent past and present)

George Aguiar (MNRM&G, active): Effect of freezing on reindeer meat quality.

Tina Busbaum (M.S., completed degree): Pollination biology of bog blueberry.

Amanda Byrd (M.S., completed degree): Biomass production and carbon sequestration potential of poplar as a short-rotation bioenergy crop

Erin Carr (M.S., active): Use of cover crops to depress weed seed germination.



Zhang, Mingchu, 2012. Size fraction of soil water soluble organic C and N under different land uses in Alaska. *Soil Sci.* 177:683-694.

Zhao, Aiqin, Mingchu Zhang, 2012. Size fraction of soil water soluble organic C and N under different land uses in Alaska. *Soil Sci.* 177:683-694.

Zhao, Aiqin, Mingchu Zhang, 2012. Spectroscopic characteristics and biodegradability of soil cold and hot water extractable organic matter under different land uses in Alaska. *Comm. Soil Scie. And*





Zhang M, He Z, Zhao A. 2011. Ultraviolet absorption features of water extractable humic fractions of animal manure and relevant compost. pp 682, In: Z. He (ed.) *Environmental Chemistry of Animal Manure*. Nova Science Publishers, Inc. Hauppauge, New York, USA.

Zhang M, Sparrow SD, Pantoja A, Bechtel PJ. 2010. Crop nutrient recovery from three land applied fish byproducts. pp 87103. In: P.J. Bechtel (ed) *A Sustainable Future: Fish Processing and Byproducts*

McGuire, D.; Osterkamp, T.; Riordan, B.; Whiting, A.; Wiles, G.; Wilmking, M. 2009. Chapter A Synthesis of Recent Climate Warming Effects on Terrestrial Ecosystems of Alaska.- 139-110 In: (Wagner, F.H. Ed.) *Climate Warming in North America, Evidence and Environmental Effects*. The University of Utah Press, 2009, 167 p. ISBN-978-0-87480-906-0

AFES Publications:

Karlsson, M. and J. Dawe. 2014. What are your implications of your research? *AgroBorealis* 44:46-47.

Holloway, P. S., Willison, S.M., and Sparrow, S.D. 2012. Germination of water sedge, *aquatilis*, and cotton sedge *Eriophorum angustifolium* from Arctic coastal wetlands, Prudhoe Bay, Alaska. *Alaska Agricultural and Forestry Experiment Station Misc. Pub* 201202. University of Alaska Fairbanks, Fairbanks, Alaska

Pampell, Rehanon, Alberto Pantoja, Derek Sikes, Patricia Holloway, and Charles Knight. "A guide to bumblebees of the Interior" *Agroborealis* 42, no. 1 (2011): 5-6.

Holloway, Patricia S.; Pearce, Shannon; Hanscom, Janice. 2010. Peony Research 2009. AFES Miscellaneous Publication-2010
Fairbanks, AK: UAF: 12 p.

Agroborealis 41(1): 28-33.

Van Veldhuizen, Bob. February 2010. Growing Small Grains in Your Garden. AFES Circular 135. Fairbanks, AK:UAF: 24 pp.

Garber-Slaght, R. , G. Holdmann, S.D. Sparrow, and d. t. masiak. 2009. Opportunities for Woody Biomass Fuel Crops in Interior Alaska. *Alaska Agricultural and Forestry Experiment Station Misc. Pub* 0909. University of Alaska Fairbanks, Fairbanks, Alaska.

Karlsson, M. 2009. Growing under the midnight sun. SNRAS/AFES Misc. Pub. No. MF02009



CES Publications:

Calhoun, K. and M. Karlsson. 2011. Growing apples in interior Alaska, suitable varieties for cold climates.
CES, UAF, HGA00043.

Other:

Juday, Glenn; Dawe, Jan; Meyers, Zach; Morimoto, Miho; Allaby, Andrew; Grant, Tom. 2013. Boreal Alaska Learning, Adaptation, Production (BAKLAP) Quarterly Report 2013 Quarter #1 (January 1, 2013-March 31, 2013). 70pp.

Juday, Glenn; Dawe, Jan; Meyers, Zach; Morimoto, Miho; Allaby, Andrew; Grant, Tom. 2013. Boreal Alaska Learning, Adaptation, Production (BAKLAP) Quarterly Report 2013 Quarter #2 (April 1, 2013-June 30, 2013). 105pp.

Juday, Glenn; Dawe, Jan; Meyers, Zach; Grant, Tom; Jess, Ryan. 2013. Boreal Alaska Learning, Adaptation, Production (BAKLAP) Quarterly Report 2012 Quarter #4 (October 1, 2012-December 31, 2012) 28pp.

Juday, Glenn; Dawe, Jan; Grant, Tom; 2012. Boreal Alaska Learning, Adaptation, Production (BAKLAP) Quarterly Report 2012 Quarter #3 (July 1, 2012-December 31, 2012). 18pp.

Calhoun, K. and M. Karlsson. 2011. Fruit tree and berry crop trial program. Final report. Western Sustainable Agriculture Research and Education.

Karlsson, M. 2011. Alaska Berries III. Final report USDA SARE.

Karlsson, M. 2011. Alaska Berries III. Progress report USDA SARE.

Calhoun, K. and M. Karlsson. 2010. Fruit tree and berry crop trial program. Progress report. Western Sustainable Agriculture Research and Education.

Juday, Glenn P. 2010. Changing the Forest and the Timber Climate? *Agroborealis* 41 (1): 78

Zhang, M., S. S. Malhi. 2010. Perspectives of canola/oilseed rape as a bioenergy crop, *Biofuel* 1 (4): 621-630 Fbks and Delta





Large Animal Research Station

Classes Using Facility

BIOL 271 Principles of Ecology

BIOL 371 Principles of Ecology

BIOL 441 Animal Behavior

BIOL 459 Wildlife Nutrition

BIOL 659 Wildlife Nutrition

WLF 101 Survey of Wildlife Science

WLF 222 Principles and Techniques of Wildlife Management

WLF 460 Wildlife Nutrition

WLF 660 Wildlife Nutrition

Course

Students since



Lewis: Comparative Study of Capture Techniques in Reindeer

Rowell: Timing of breeding and gestation length in muskoxen; Fetal development following timed conception; Testing the utility of electric fence for muskox containment; Efficacy of commercially available sheep CIDRs for estrous synchronization in farmed reindeer; Farmed muskox behavior as it relates to handling efficiency

Shipka: Genetic testing of muskoxen

Publications Based on Research Conducted at Facility

Colson, K.E.; Mager, K.H.; Hundertmark, K.J., Reindeer Introgression and the Population Genetics of Caribou in Southwestern Alaska, 2014, *Journal of Heredity*, 105, 565

Gustine, D.D.; Barboza, P.S.; Addison, J.; Shively, R.; Oliver, L., Isotopic nitrogen in fecal fiber as an indicator of winter diet in caribou and muskoxen, 2014, *Rapid Communications in Mass Spectrometry*, 28, 62534

Thompson, D.P.; Barboza, P.S., Responses of caribou and reindeer (*Rangifer tarandus*) to acute food shortages in spring, 2013, *Can. J. Zool.*, 618

Mager, K.H.; Colson, K.E.; Hundertmark, K.J., High genetic connectivity and introgression from domestic reindeer characterize northern Alaska caribou herds, 2013, *Conservation Genetics*, 14, 1111-1123

Cameron, R.D.; Griffith, B.; Parrett, L.S.; White, R.G., Efficacy of calf: cow ratios for estimating calf production of arctic caribou, 2013, *Rangifer*, 33, 327

Lauper, Murielle; Lechneit, Isabel; Barboza, Perry S.; Collins, William B.; Hummel, Jurgen; Codron, Daryl; Clauss, Marcus, Rumination of different sized particles in muskoxen (*Ovibos moschatus*) and moose (*Alces alces*) on grass and browse diets, and implications for rumination in different ruminant feeding types, 2013, *Mammalian Biology*, 78, 152

Williams, Cory T.; Barnes, Brian M.; Buck, C. Loren, Daily body temperature rhythms persist under the midnight sun but are absent during hibernation in living arctic ground squirrels, 2011, *Biology Letters*, Online

Klein, David R.; Shulski, Martha, The role of lichens, reindeer, and climate in ecosystem change on a Bering Sea island, 2011, *Arctic*, 64, 353

Finstad, Gregory L.; Kielland, Knut, Landscape Variation in the Diet and Diversity of Reindeer in Alaska Based on Stable Isotope Analyses, 2011, *Arctic, Antarctic, and Alpine Research*, 76, 543-554

Ashley, N.T.; Barboza, P.S.; Macbeth, B.J.; Janz, D.M.; Cattet, M.R.L.; Booth, R.K.; Wasser, S.K., Glucocorticosteroid concentrations in feces and hair of captive caribou and reindeer following





Areas in Alaska; The effect of forage variety and color of plastic wrap on haylage quality and quantity in Alaska; High Spatial Resolution Vegetation Mapping for Assessment of Wildlife Habitat; Calculating the Carrying Capacity of Moose Habitat on the Chugach National Forest, AK using Remote Sensing; Ground Surveys and Nutritional Analyses; Seasonal Movements, Diet Composition, and Plant Nutritional Quality of Unimak Island Caribou; Characterization and Delineation of Caribou Habitat on Unimak Island using Remote Sensing Techniques

Jeff Smeenk; Season Extension for High Latitude Market Garden Production; Collaborative Work on Virus Free Potato

Alberto Pontoya; Enhance the Quality and Characterize Germplasm and Crops Adapted to Alaska; Utilizing Fish Waste as Soil Amendment For Food Production

Bonnie Fuhrman; Blueberry Variety Evaluation (Grant)

Projects involved eight Master's level graduate students. Six students were from UAA and two were from UAF. Six of the students completed their degrees.

Publications Based on Research Conducted at Facility

Journal Articles

Payyavula, R. S., Navarre, D. A., Kuhl, J., & Pantoja, A. (2013). Developmental effects on phenolic, flavonol, anthocyanin, and carotenoid metabolites and gene expression in potatoes. *Journal of agricultural and food chemistry*, 61



Chiapella, Jorge O., Veronica L. DeBoer, Guillermo C. Amico, and Joseph C. Kuhl. "A morphological and molecular study in the *Deschampsia cespitosa* complex (Poaceae; Poaceae) in northern North America" *American journal of botany*



Pantoja, Alberto, Aaron M. Hagerty, Susan Y. Emmert, and Joseph E. Munyaneza. "Leafhoppers (Homoptera: Cicadellidae) associated with potatoes in Alaska: species composition, seasonal abundance, and potential phytoplasma vectors." *American journal of potato research* 86, no. 1 (2009): 6875.

Robertson, N. L., and Brown, K. L. Identification and Molecular Characterization of a Potyvirus Isolated from Native Lakspur (*Delphinium glaucum*) in Alaska. *Plant Dis.* 93(4): 428. 2009. Palmer

Kuhl, Joseph C., and Veronica L. DeBoer. "Genetic diversity of rhubarb cultivars." *Journal of the American Society for Horticultural Science* 133.4 (2008): 587-592.

Hagerty Aaron M., Alberto Pantoja, and Susan Emmert. "First record of diamondback moth (Lepidoptera: Plutellidae) from interior Alaska." *Western North American Naturalist* 68, no. 2 (2008): 249-250.

Book Chapters:

Zhang, M. (2014). Distribution and Biodegradability of Water Soluble Organic Carbon and Nitrogen in Subarctic Soils Under Three Different Land Uses. In *Applied Manure and Nutrient Chemistry for Sustainable Agriculture and Environment*. Fbks, Delta & Palmer