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June 30, 2011

Wyoming Department of Agriculture
Wyoming Wildlife Livestock Disease Research Partnership
2219 Carey Avenue
Cheyenne, WY 82002

Re: Final Report for WYAG49679

Dear Chairman and Partnership Members,

Please accept this letter and attached supporting documents as the final report for the research project "Cost to Cattle Producers and Outfitters of Brucellosis Management Alternatives."

The following bullet points address the information required for the final report, as specified in the Cooperative Service Agreement.

(i) Status of the Project tasks and activities that have been performed to date.

Objectives 1 & 2: Costs of alternative brucellosis management tools & Profitability of a cow-calf operation versus a stocker operation

July 2010 – Jun 2011

Trent Roberts was hired in August of 2009 to address objectives 1 & 2 for his master's thesis. Mr. Roberts recently completed these objectives when he defended his master's thesis, entitled "Costs and expected benefits to cattle producers of brucellosis management strategies in the Greater Yellowstone Area of Wyoming" in May 2011. Trent's *thesis* and a *synopsis of his results* are **attached** for the committee's convenience.

During the two years Trent worked on this project, he updated an existing ranch budget to reflect baseline economic conditions on a "typical" Sublette County cow-calf-yearling operation. He then adjusted this budget to account for all costs associated with each of the following brucellosis management activities: fencing a haystack, hazing elk from cattle feedlines by the Wyoming Game & Fish Department, adult-booster vaccination (two scenarios), spaying heifers, hiring a full-time rider to reduce cattle/elk comingling during winter and spring, delayed grazing of high-risk allotments, and switching to a stocker steer operation. Trent developed draft cost estimates last fall, and mailed those to roughly one dozen Sublette County producers for review. Seven producers met with Trent to discuss his estimates, which he then revised to incorporate the producers' feedback.

Trent's final cost estimates are now published in his master's thesis, which is available to the public through the University of Wyoming's Coe Library. He has drafted several Cooperative Extension Fact Sheets, which have undergone external review and should be available by the end of this summer. To raise awareness about his research, Trent provided updates at every Brucellosis Coordination Team meeting held since the fall of 2009. We are also in the process of drafting a manuscript for a professional veterinary/epidemiology journal. This will provide cost information that other researchers can use to advance their work on brucellosis management. Trent was recently hired by JBS Inc., and will work as an economic analyst in a feedlot-manager trainee program in Greeley, Colorado.

Objective 3: Effects of reduced elk populations on demand for guided hunts

May 2010 – June 2011

Mandy Kauffman was hired in August 2008 to address objective 3. She spent the first year of her graduate program collecting the necessary data for the proposed regression analysis. She spent the second year of her graduate program running regressions on the data set to estimate the effects of reduced elk populations on demand for guided hunts. Reduced elk populations were expected to affect demand for guided hunts in two ways. First, reduced elk populations might reduce the success rate of hunters, and in turn lower their willingness to hunt in the affected area. Second, reduced elk populations might decrease the number of animals hunters see during the season, and hence negatively impact their satisfaction, and reduce their willingness to apply for a permit in the affected area.

Mandy's analysis required two regression equations. The first equation estimated hunter success as a function of elk population density, hunt area characteristics, wolf predation pressure, and proportion of hunters using a professional guide. The second equation estimated the number of applications submitted for individual hunt areas (i.e. quantity demanded) as a function of the number of permits available, odds of drawing a permit, elk population, quality of bull elk in the area, success rate of hunters in the previous year, number of wolves in the area, permit price, price of a substitute permit type, income, time trend, and hunt area characteristics.

Regression results were finalized in September 2010, and Mandy successfully defended her thesis in October 2010. Mandy encountered a variety of challenges with data. She struggled, for example, to obtain precise historical prices for guided hunts in northwest Wyoming, and did not have enough time to collect data on the price or quality of hunts in neighboring states. The precision of elk population estimates from Wyoming Game & Fish Department is also uncertain, due to the inherent difficulty of counting wild animals, especially in non-feedground areas. These data challenges may affect the quality of Mandy's regression results; however, the results still provide many useful insights. Details of her methods and results are available in her master's thesis through the Department of Agricultural and Applied Economics at the University of Wyoming. An electronic copy of her *thesis* and a *synopsis of her results* are **attached** for the committee's convenience.

This spring, our research team developed a journal manuscript from Mandy's research that is currently in review at the professional journal *Human-Wildlife Interactions*. We are also in the process of developing a Cooperative Extension Bulletin, which will summarize her research in a format more easily accessible for outfitters, wildlife managers, and policymakers. Mandy is

currently pursuing a PhD in veterinary epidemiology through the Veterinary Sciences Department at the University of Wyoming under Dr. Brant Schumaker's supervision. Her doctoral research will focus on brucellosis management.

(ii) The recipients of expended WWLDP grant funds under the project referenced in Attachment A, and purpose of expending said funds (2008-2011).

Note: the following expenses are rough estimates only. UW's Research Office will send official budget reports in the near future.

- Graduate assistantships and stipends: $36,432
- Summer salary for Drs. Peck, Rashford, Ritten: $27,383
- Travel, data, equipment, supplies: $5,810
- Sum of expended funds: **$69,625**

(iii) Information about hard-dollar and in-kind matching funds used for WWLDP Project described in Attachment A.

- Funds from the Governor's Federal Natural Resources Policy Account, in the amount of $50,000 served as a hard-dollar match. Expenditures from this account were as follows: graduate assistantships and stipends ($36,342); summer salary for Drs. Peck, Rashford and Ritten ($11,901); travel, data, equipment, supplies ($1,757); **total ($50,000)**.
- Funds from Dr. Peck's startup package and departmental allocation were also used as hard-dollar matching funds to pay for travel expenses associated with data collection and the Brucellosis Coordination Team's meetings in 2009, 2010 and 2011: $1,838.
- Time dedicated to the project by Drs. Peck, Ritten and Rashford during the academic year also served as in-kind matching funds: $17,787.

(iv) Success of the Project, including proposed and actual outcomes to date.

The proposed outcomes of the Project have been accomplished, along with a few additional outcomes, including the following:

- Cost estimates for fencing a haystack, WG&F hazing of elk, adult-booster vaccination (two scenarios), spaying heifers, hiring a full-time rider, delayed grazing of high-risk allotments, and switching to a stocker steer operation.
- Master's thesis by Trenton Roberts regarding the cost of various brucellosis management strategies.
- Draft Cooperative Extension fact sheets summarizing Trent Roberts' research results.
- Presentation of Trent Roberts' research results at the upcoming Western Agricultural Economic Association's annual meeting.
- Estimates of the effect of reduced elk populations (associated with proposed changes in elk feedground management) on hunter success and applications for elk hunting permits in northwest Wyoming.

- Master's thesis by Mandy Kauffman regarding the effects of elk populations on hunter demand in northwest Wyoming.
- Journal manuscript (in review) summarizing Mandy Kauffman's research results.
- Presentation of Mandy Kauffman's research results at a seminar hosted by Colorado State University's Department of Agricultural and Resource Economics.
- Presentation of Mandy Kauffman's research results at the upcoming Western Agricultural Economic Association's annual meeting.
- Presentation of Trent and Mandy's research results at a seminar for the Department of Animal Science at the University of Wyoming.

Thank you so much for supporting this research project. I hope you are pleased with our research team's performance. I believe our results and outputs offer valuable insights that will help inform on-going efforts to manage brucellosis in the Greater Yellowstone Area.

Respectfully submitted,

Dannele E. Peck

cc: University of Wyoming Office of Sponsored Programs

Enclosed:
Trent Roberts' M.S. thesis
Synopsis of Trent Roberts' research for objectives 1 & 2
Mandy Kauffman's M.S. thesis
Synopsis of Mandy Kauffman's research for objective 3