Executive Summary

Introduction

This retrospective review of NP215 Grass, Forage, and Rangeland Agroecosystems (2018-2022) is intended to provide external feedback to ARS regarding the achievements and products accomplished, and the relevance, quality, and impact that these may have on the field of knowledge, on-farm practices, and on policy decisions. The panel includes five members representing different fields of study and geographic regions within the USA.

The Review Process

The review panel was provided with the NP215 Action Plan (2019-2023) which lists the components or focus areas and the problem statements, or goals, relevant to each component. The Retrospective Report and Appendix (August 2022) summarized the NP215 project and described accomplishments that represent each component. The NP215 website and team websites were provided, as was a template to author this report.

The review panel participated in a training session to facilitate understanding of the review process and expectations. The four hour review meeting was held via web conference where the National Program Leadership presented an overview of the NP215 Components and Accomplishments, and scientists affiliated with NP 215 presented their research findings, outcomes, and products.

The NP215 project was organized by four component areas: 1) Basic knowledge of system components; 2) Plant physiology and genetics; 3) Tools for better system management; and 4) Management for environmental conservation and beneficial use. There are either two or four focus areas within each of the components, for a total of 12 focus areas. The review of each focus area was authored by a panel member and then reviewed and edited by the other panel members.

Overview of the Panel's Findings

The NP215 presents broad subject matter since the research expertise within this national program varies from basic and fundamental science to applied science. Research on molecular topics is included alongside that of applied systems research on an ecosystem scale. This range of topics was well packaged and presented to the review panel by the Program Leadership. There are beneficial linkages to other national programs and the value of NP215 is clear.

Several suggestions on NP215 overall were made by the review panel. The review panel suggests that the current name of NP215 be reconsidered since grasses are forages, but both are in the title. Additionally, the current title does not include introduced pastures or feedstocks for bioenergy or bioproducts. A suggestion is 'Forage, Feedstock, Turfgrass, and Grazinglands', which would reflect all of the broad topical end uses encompassed in NP215. Additionally, it was noted that terminology should be used consistently. Adoption of *An International Terminology for Grazing Lands and Grazing Animals* as a standard is recommended (Allen et al., 2011 in Grass & Forage Science, 66:2-28). Comparison of the Action Plan, Retrospective Report, and Appendix by the review panel could be facilitated by adding navigation links and/or hyperlinked table of contents within each document. Overall, there is a paucity of research results in the Southeastern and South Central USA, much less effort devoted to grazing of introduced pastures compared to rangeland focused projects, and limited research on legumes other than alfalfa. The review panel agrees that this gap is likely a reflection of the areas in which ARS facilities with scientist associated with NP215 are concentrated and not a failing on the part of scientists, who have made extraordinary progress in five years.

The following list is a summary of the panel's conclusions for each of the four components:

Component 1. Basic knowledge of system components: The primary goal was to provide fundamental knowledge and understanding of interacting ecological components of grass, forage, and rangeland agroecosystems. Component 1 included basic research on physics, biology, ecology, microbiology of forage and rangeland systems which should be useful to advance the field of knowledge and inform other components. The panel rates the work completed as highly relevant, high quality, and innovative with the potential to have meaningful impact once the basic science is translated to applications. Reviewers noted potential collaborators and the importance of collaboration to successfully transitioning basic to applied science and maximizing outcomes and deliverables.

Component 2. Plant physiology and genetics: The primary goal was to improve the physiology and genetics of plant materials to enhance health, vitality, and utility of pasture, biomass for feed and fuel, rangeland, and turf systems. Research is characterized as basic and sought to improve plant phenotyping, physiological traits and processes, and genomes. Development and release of germplasm is an applied outcome of component 2. The panel rates the work towards the Action Plan as highly relevant and meeting the needs of stakeholders, meeting the highest standards of quality, and meaningful impact. Problem statement 2B is highly relevant to stakeholders and progress to meeting the goals of the Action Plan was good. The problem statements within 2B should be evaluated for overlap with others in components 2 and 3 and outcomes and outputs, such as publications, should be improved. Particularly noteworthy accomplishments within Component 2 are the germplasm releases, whole genome sequencing, and marker identification. This component is highly collaborative, and an important contribution of ARS is their strategic investment in long-term agricultural research, such as that of breeding perennial plants.

Component 3. Tools for better system management: The primary goal was to develop integrated science-based tools to foster improved management of grass, forage, and rangeland agroecosystems. Research (3A) was more applied and included monitoring system function at different scales. Tool development (3B) included Grass-Cast for forages in hay meadows or pastures, The National Turf Evaluation Program (NTEP) database for turfgrass, and many tools focused on rangelands. The review panel was interested to learn about the useful products of 3B. The panel identifies a gap in the Southeastern and Southern USA in this topic area. Overall progress to meet the goals and anticipated products in the Action Plan was highly relevant, of high quality, and impact that is meaningful clearly stated.

Component 4. Management for environmental conservation and beneficial use: The primary goal was to generate strategies to manage grass, forage, and rangeland agroecosystems that simultaneously contribute to environmental conservation and are beneficial to human and animal use. Research included grazing as a tool to reduced fuel loads which intercepted three wildfires in four years, alfalfa grown with corn, carbon cycling of biomass feedstock production systems, and cheatgrass control during perennial grass establishment. The review panel agrees that priorities in the Action Plan were mainly addressed with the exception gaps listed for 4B. The research is highly relevant, of excellent quality, and results in meaningful impact. The panel identified the limited amount of activity relative to pasture systems commonly in the more humid regions of the country. A high level of activity on Component 4 was focused on range environments, and consideration of activity in more diverse environments is recommended.

Conclusions

In general, the review panel concluded that the rating of **High Impact**. High-quality research is indicated by the high number of publications and accomplishments presented by the NP215 team. There are gaps noted in this report; however, they are not a function of the relevance, quality, or impact of the work of the NP215 team, but apparently a reflection of the locations of ARS facilities, the long timeline necessary for much of the work within this field of study, or similar rationale. Impacts to policy and regulations, reduction of wildfire, fellow scientists, and stakeholders are meaningful, important, and clearly stated.