**Common experiment notes in joint session of crop and grazing groups**

1. **Replication, spatial versus temporal.**

a. What is possible for each site?

b. Use of BACI designs.

c. Can historical/longitudinal information or baseline substitute for replication in judging change?

d. Replication may vary for different measurements.

1. **Longevity and site security** for cropland sites with leased land especially.
   1. How to entice landowner to stick with Asp treatment? Compensation? Target progressive youth? Working with trusts/easements via American Farmland Trust, TNC.
2. **Scale**, fit a big rep to EC towers, with other reps as smaller fields.
3. **Design**
   1. Have all phases of a rotation each year?
   2. Common reference (native or not intensively managed, or untilled, early successional) condition for cropland as a third "enrichment" treatment--this will be difficult for some sites, need examples, maybe only some sites
4. **Scaling up to regional scale**
   1. Tier 1: Intensively monitored, experimental work, developing mechanistic understanding, stable tenure.
   2. Tier 2: Selected variables measured, used to test understanding—farmer-owned sites that are monitored
   3. Tier 3: Further validate the model, scaling up to region (just remote sensing), farmer sites.

1. **Tradeoffs among ecosystem services**
   * 1. General goal is to promote as many services as possible without compromising "yield".
     2. Core principles for addressing tradeoffs?
     3. "Knowledge intensification", how to integrate information about multiple ecosystem services in making decisions? Tech transfer issues.
2. **Standardization of variables for comparison**/derived variables.

WUE

Nutrient/energy use efficiency

NPP/Harvest

Close C, N, P, water budgets?

Core ecosystem services--biogeochemistry, pollinators/beneficials, soil function/decomp, food safety, climate resilience

Ratios or delta of BAU:Asp to compare across sites

1. **"Satellite" site experiments to get at mechanisms** for differences among treatments , embed in experimental treatment levels

**Rangeland/grazingland specific group**

*Ecosystem services of interest*

* Supporting
  + NPP
  + Soil health variables
  + Biodiversity (key indicators species)
* Provisioning
  + Livestock weight gain, conception rates, calving rates, weight gain
* Regulating
  + Carbon sequestration in soil (SOM)/vegetation
  + Water storage and quality
  + Nutrient transport
  + GHG mitigation
  + Air quality
  + Soil stabilization
* Cultural
  + Recreation, hunting (interviews, cultural services mapping using online, spatially explicit approach to quantify recreational/aesthetic values)

SRR link to categorization of services

*Profit*

* Inputs: costs such as labor, equipment, seed, animal health, loan costs, land and capital
* Income: Price/unit production, amount produced (e.g., calves), and also hunting leases, conservation payments (payments to private land owners to achieve goals that are required on public land)

TBD: What gets measured where? Subsets of replicates. Towers in 1 rep of each treatment level

**Core measurements that can be compared**

1. NPP

Grazing cages, utilization?

Plant nutrient content? (N /fiber)

NUTBAL (NRIS) forage quality

Dung metagenomics (Noah Fierer)

2. Biodiversity (functions/indicators)

Pollinators/sentinel hives

Birds

Soil biota

3. Beef production, calf crop

4. Profit/economics

5. Soil health/function

e.g., 5 yr soil C

Sediment transport