

A close-up photograph of a Greater Sage-grouse chick. The chick is covered in brown and white mottled feathers, with a dark eye and a pointed beak. It is sitting on the ground, surrounded by dry twigs and some green grass blades. The background is a soft-focus natural setting.

Application of Stable Isotopes to Reconstruct Greater Sage-grouse Chick Dietary History

**K.T. Smith, A.C. Pratt,
J.R. LeVan, and J.L. Beck**

**¹Department of Ecosystem Science and
Management University of Wyoming**

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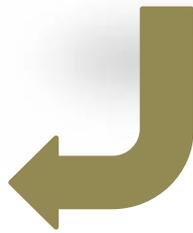
Nesting



Structural cover

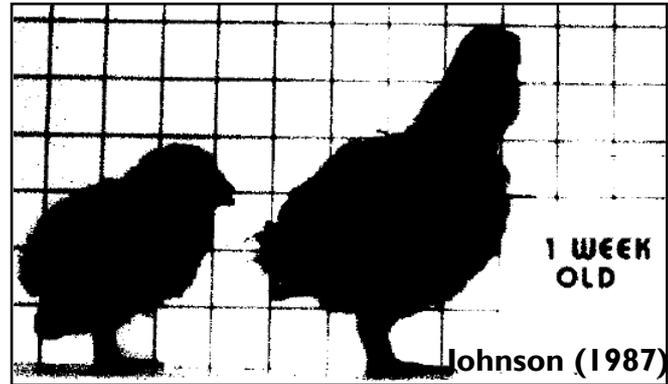


Fledging





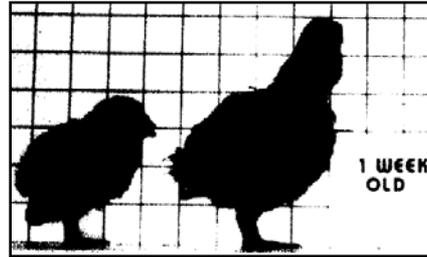
Juvenile Dietary Requirements



- Johnson and Boyce (2002) – insects crucial during early life (10 days)
- Huwer et al. (2008) – forb abundance at related to increased growth rates
- Blomberg et al (2013) – increased growth when chicks quickly transition to more herbaceous diet



- Productivity often measured as survival to XX days post-hatch



Johnson (1987)



Blomberg et al. (2014)



Vitz and Rodewald (2011)



Tollefson et al. (2011)



Objectives

- Dietary selection

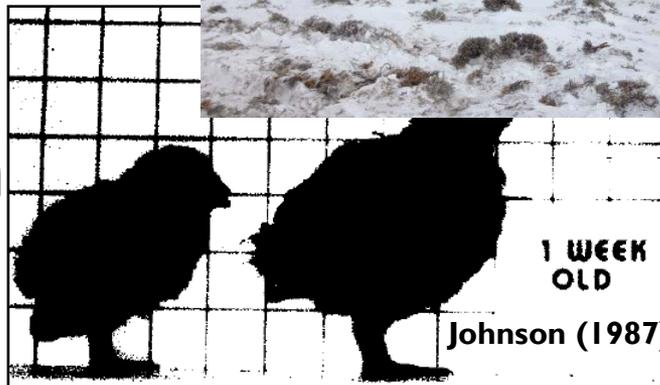


- Dietary composition

- Body condition



- Abundance



degraded habitats



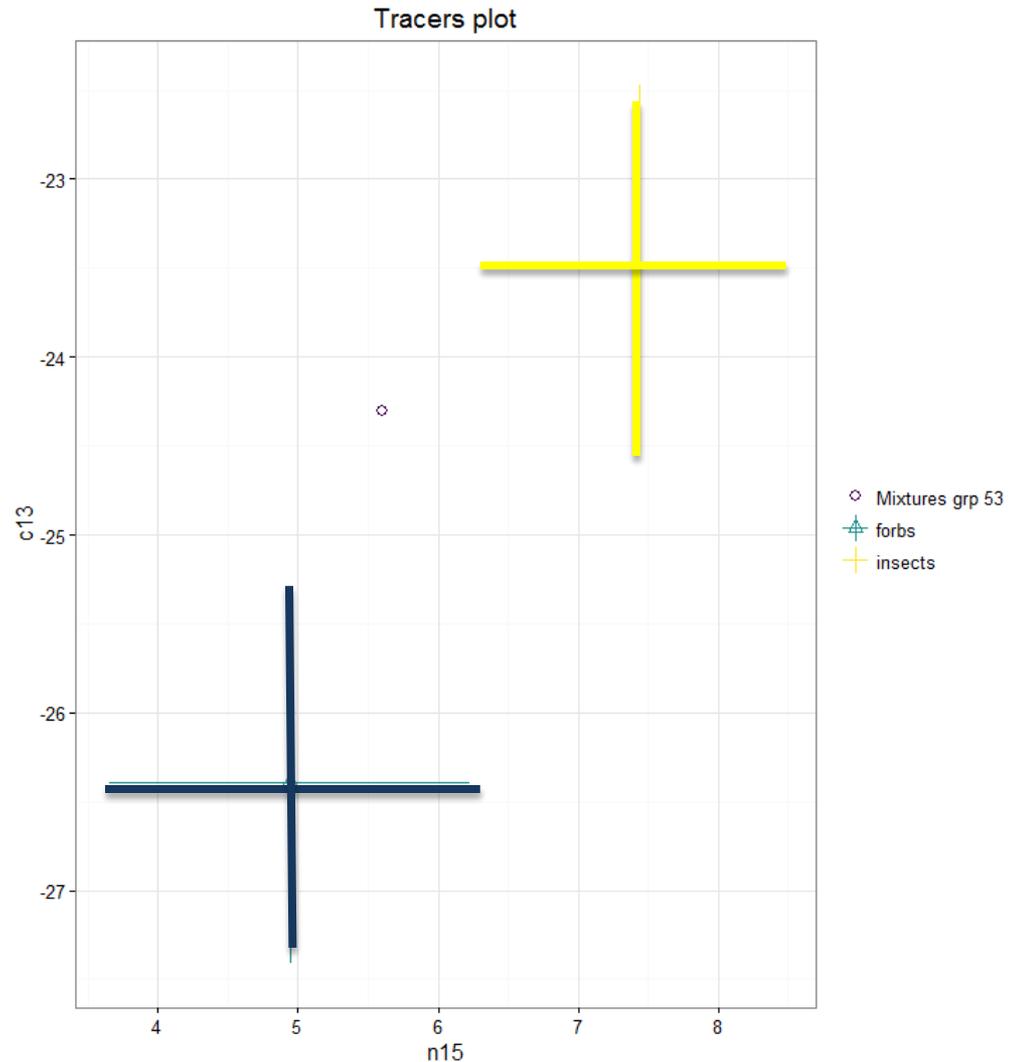
Stable Isotope Analysis



← Time

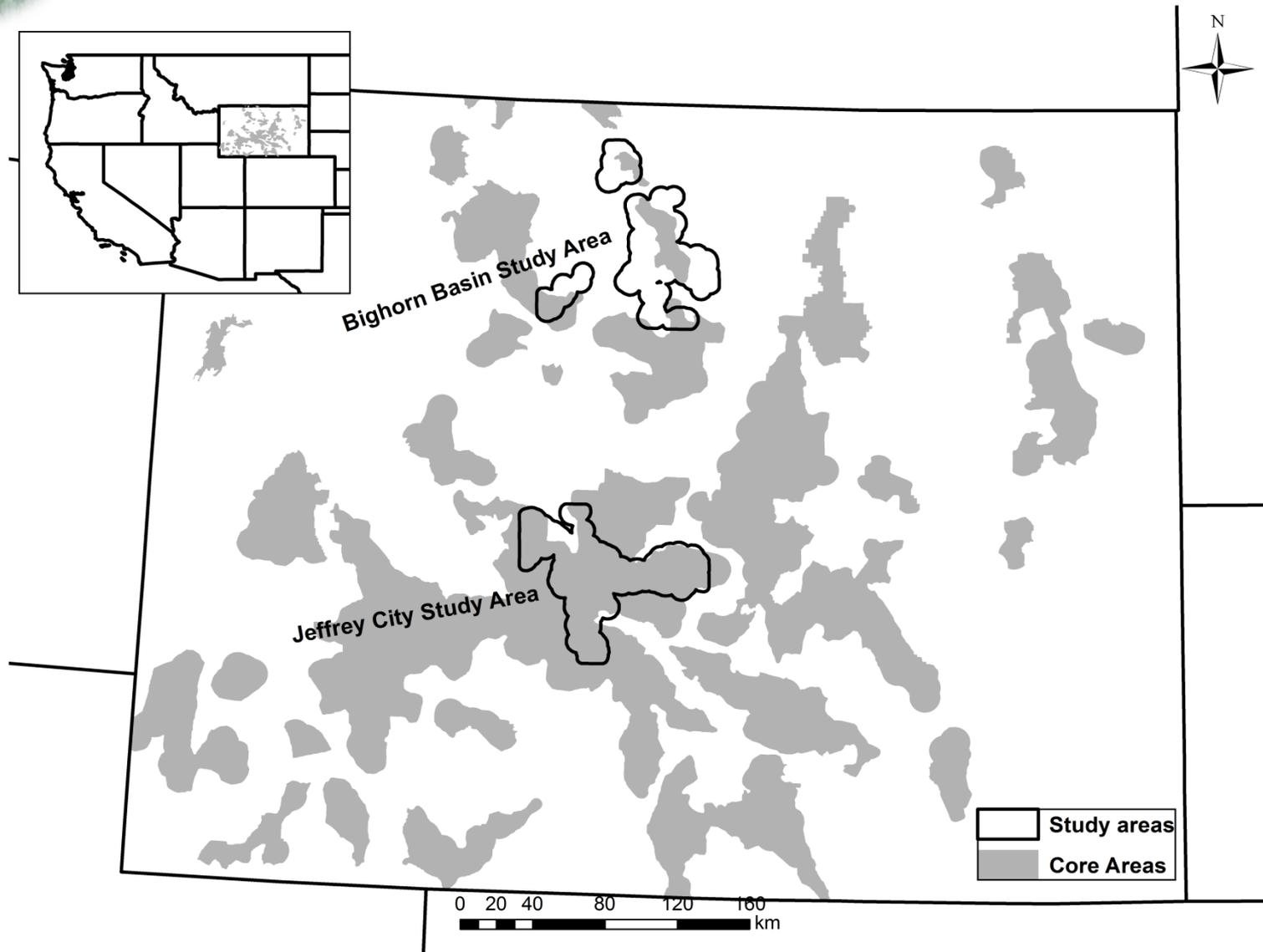
Isotopic Fractionation

Example: When insects eat plants they preferentially incorporate the heavier Nitrogen isotope

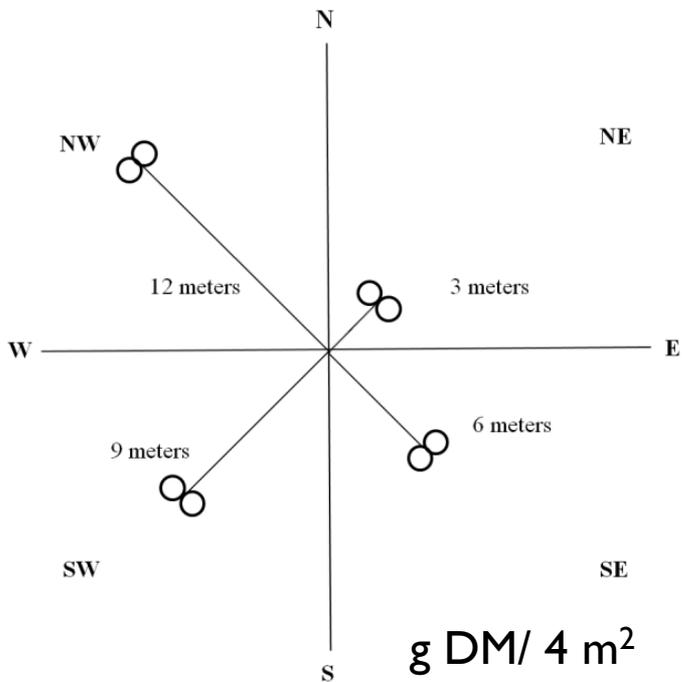
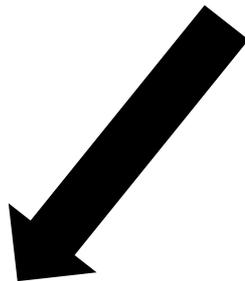
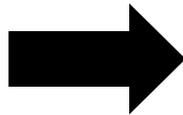




Study Area



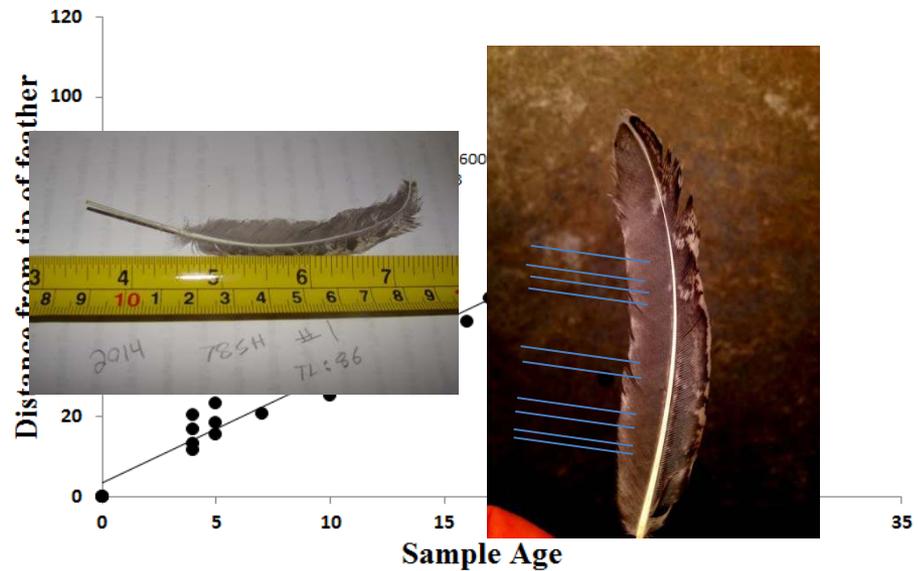




Capture at 35 d post-hatch

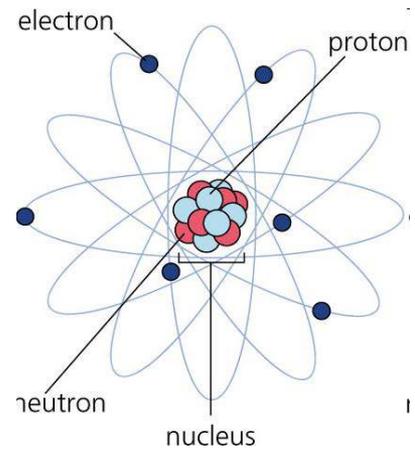


Estimating feather age



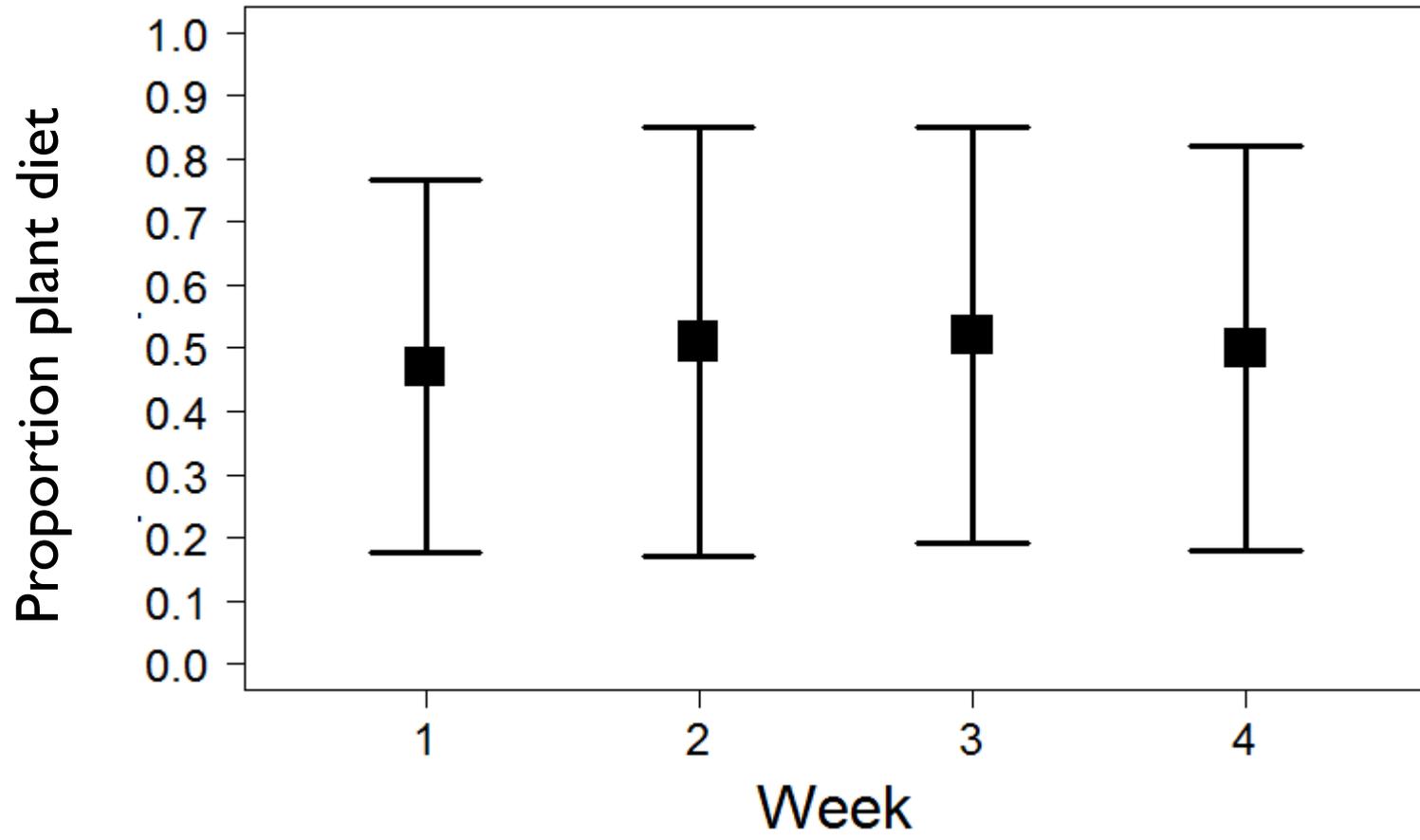
Blomberg et al. (2013)

Stable isotope analysis $\delta^{15}\text{N}$





Single element two source mixing model





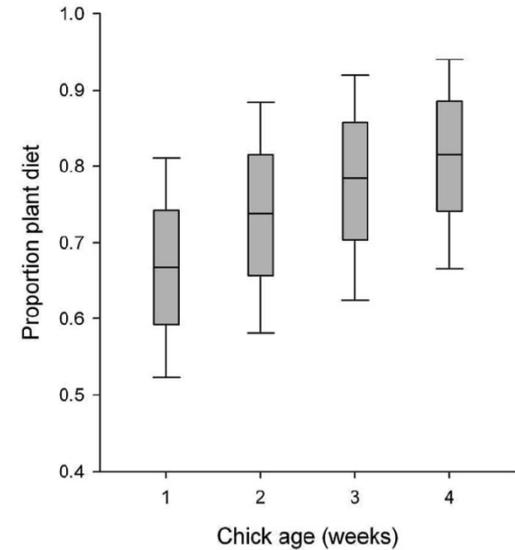
Brood Site Selection

- Conditional logistic regression

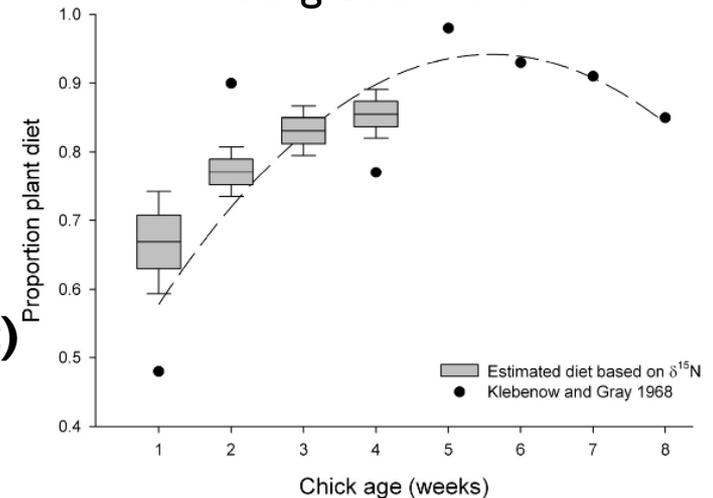
↑ Forb abundance during week 4

Dietary consumption at Brood-rearing Locations

- GLMM: Feather $\delta^{15}\text{N}$
- **Unrelated to diet availability**
- **$\delta^{15}\text{N}$ decreased with week (increase in plant diet)**



Blomberg et al. 2013





Relative Body Condition

- Age-corrected residuals
- GLMM
 - MASS
 - Wing chord



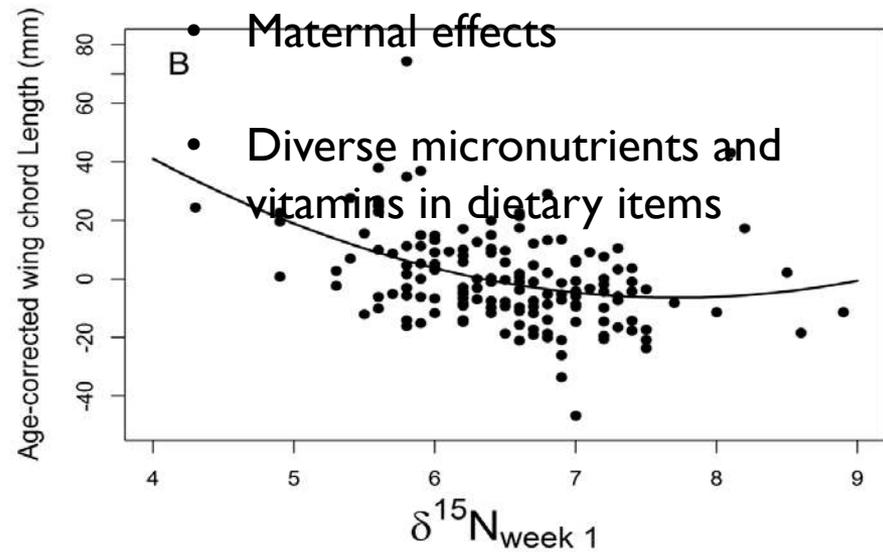
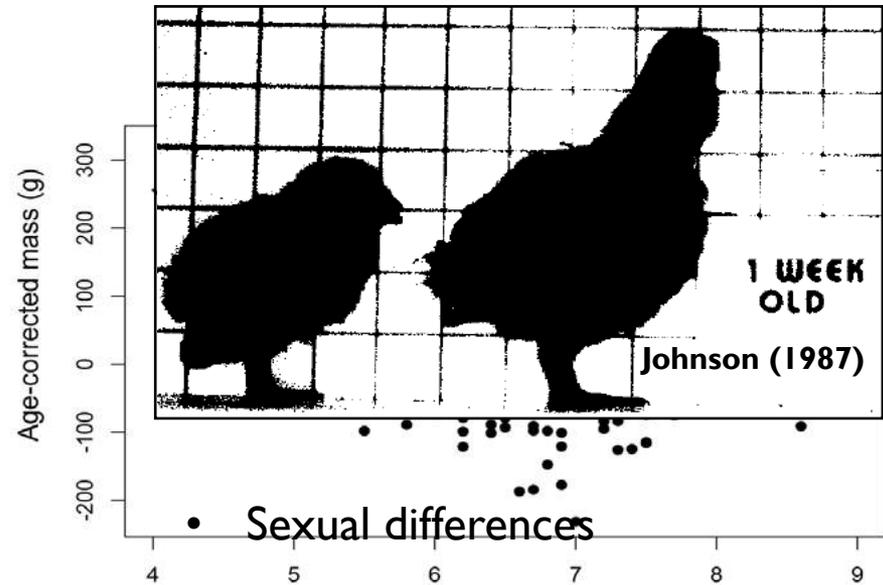
Plant diet during week 1



Plant diet during week 1 + 2



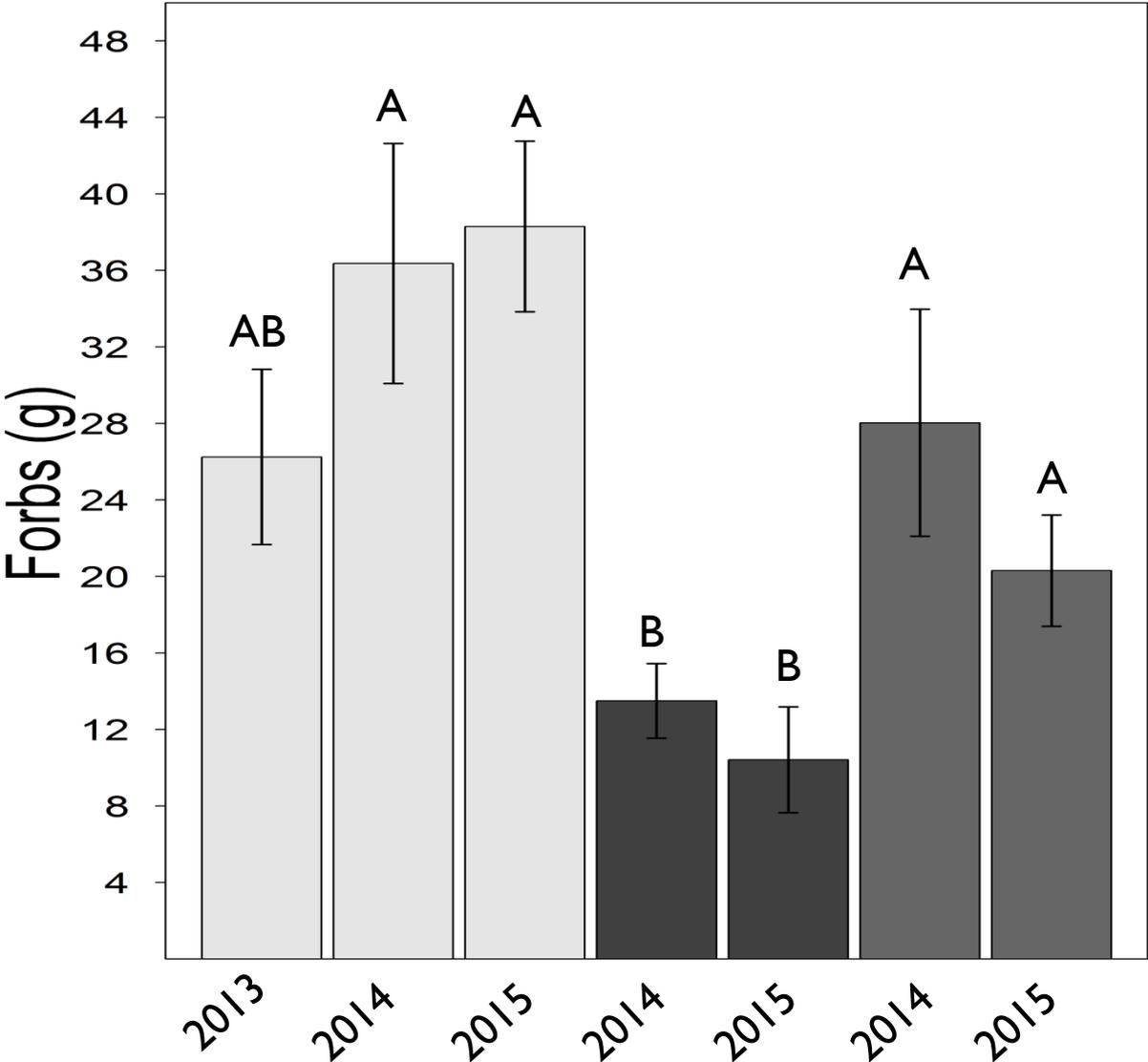
Mean plant diet



Dietary Abundance at treated habitats



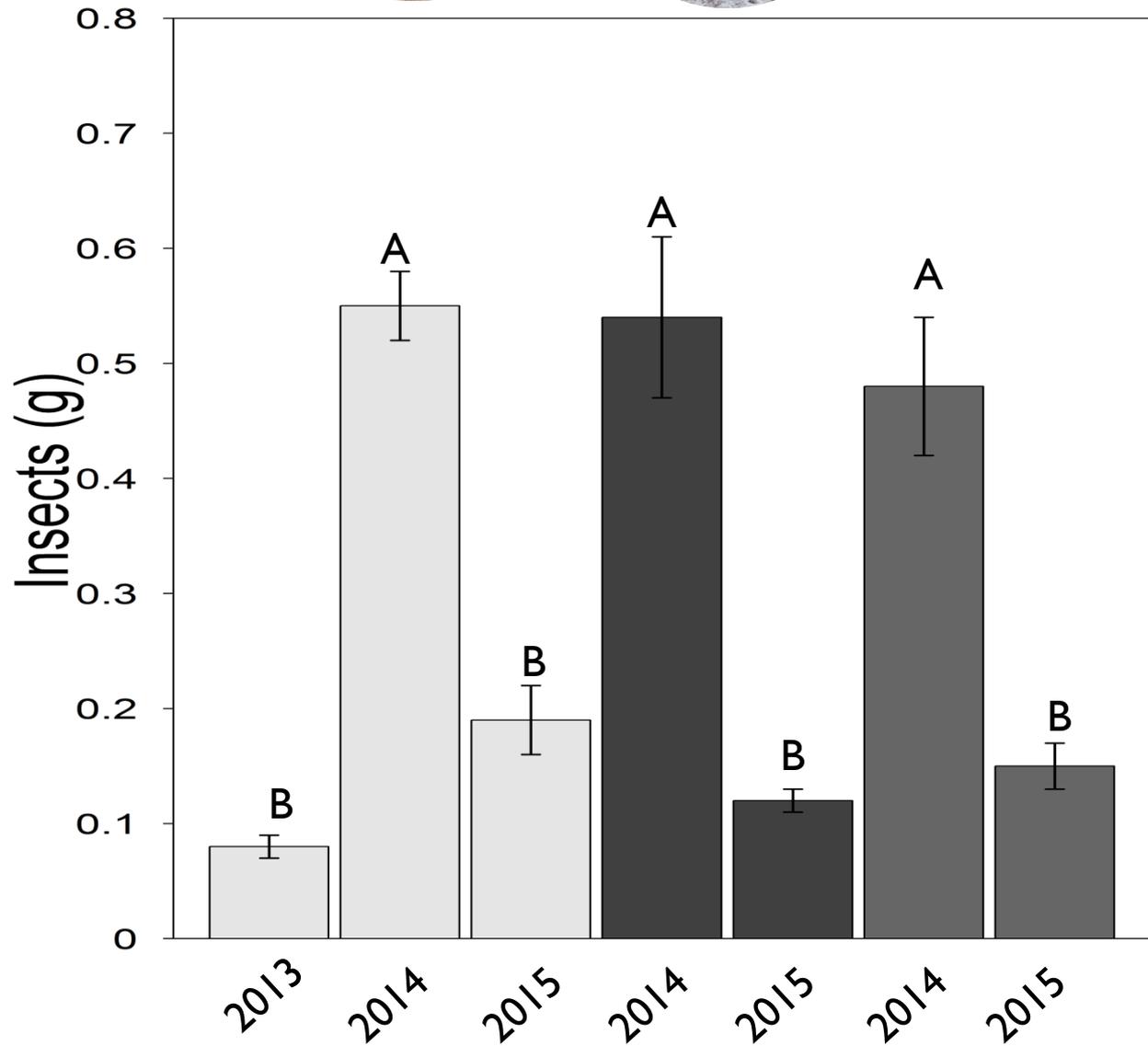
Spike® 20P



Dietary Abundance at treated habitats



Spike® 20P





- Selection for forbs—week 4
- Selection \neq dietary consumption
- Larger chicks eat more forbs



> or =



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Wyoming Reclamation
and Restoration Center

