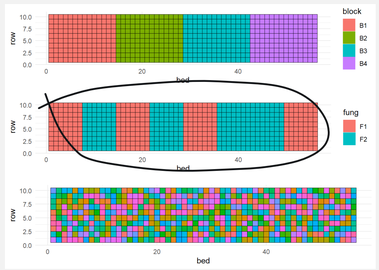
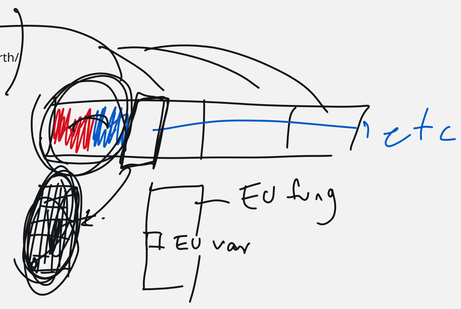
TRT structure
Design CRD RCBD

Fungicide-Barley experiement:
Grown in 1995-1996 at the Scottish Crop Research Institute 4 blocks, 2 fungicide treatments, and 70 barley varieties. Total area was 10 rows (north/south) by 56 beds (east/west).





$$y_{ijk} = \mu + F_j + V_k + (FV)_{jk} + b_i + w_{j(i)} + \varepsilon_{ijk}$$

Animals, housing, and treatments

A total of 70 newborn piglets [initial body weight (BW): 1.83 ± 0.31 kg; Yorkshire × Yorkshire, Yorkshire × Duroc, Yorkshire × Duroc × Duroc; 40 males and 30 females] from 7 lactating sows with 8 to 12 piglets per litter were allotted into 4 treatments within the litter in a 2 × 2 factorial design (main factors were the number of iron injection and dietary iron level in nursery diets) based on BW and sex and housed in the farrowing crate along with the sow, with a heat lamp and mat provided. At days 2 to 3 of age (day 0 of the experiment), all piglets received the first intramuscular (i.m.) injection of 200 mg iron and were processed based on the standard protocol of UWRF Mann Valley Farm in which male piglets were castrated on day 10 of age. Piglet sets were created by having 4 littermates within the same sex that had similar BW. Within each set, 2 piglets were assigned to the 1 iron injection treatment and the others to the second iron injection treatment. Treatments were: 1) Negative control (NC): No additional iron injection + NC diets (100 mg/kg iron) in nursery period, 2) IRON + NC: Second i.m. iron injection (200 mg) at 5 d after the first injection + NC diets in nursery period, 3) Positive control (PC): No additional iron injection + PC diets (200 mg/kg iron) in nursery period, and 4) IRON + PC: Second i.m. iron injection (200 mg) at 5 d after the first injection + PC diets in nursery period. A common iron-dextran product (UNIFERON 200, Pharmacosmos, Inc., Watchung, NJ) was used for both injections. The piglets in the second iron injection treatments (IRON + NC and IRON + PC) received an additional 200 mg of i.m. iron injection at 5 d after the first injection (day 5 of the experiment) and all piglets were weaned at day 25 of the experiment (days 27 to 30 of age). There was no cross-fostering among litters and no creep feed was provided to the piglets during the entire suckling period. At weaning, all remaining piglets after tissue collection were moved to the nursery facility, mixed, and sorted by BW and sex to avoid sow effects. Then, the pigs within iron injection treatments were divided into nursery diet treatments in 3 replicate pens per treatment balanced by BW and sex with 5 or 6 pigs per pen for a 27-d postweaning growth period. The piglets were housed in raised-deck nursery pens (1.32 m × 1.63 m) with plastic or woven-wire flooring in an environmentally controlled nursery facility and had free access to water and feed. After weaning, piglets tested positive for hemolytic *E. coli* strains and *Rotavirus enteritis*. This was confirmed as fresh feces were collected at days 6 and 13 postweaning and analyzed at the Iowa State University Veterinary Diagnostic Laboratory (ISU-VDL, Ames, IA).

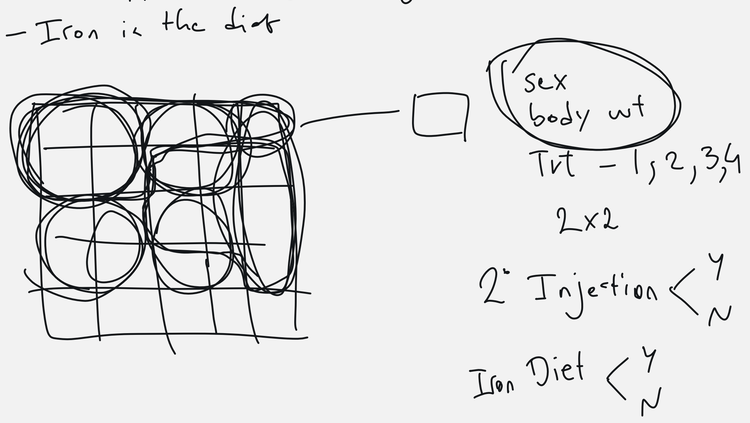
Data and sample collection

In the suckling period, the BW of each pig was recorded at initial (day 0 of the experiment), days 5, 11, 18, and 25 (weaning) of the experiment. Blood samples from all pigs were collected from the jugular vein into K_3 EDTA tubes each day when BW was recorded for hematocrit analysis. A drop of blood from the ear veins of the pigs was loaded into disposable microcuvettes via capillary action and analyzed for hemoglobin levels.

At weaning, 3 gilts per iron injection treatment that had average BW within the iron injection treatment were selected and euthanized by penetrating captive bolt by trained personnel, followed by exsanguination for liver sample collection. Collected liver samples were flash-frozen in liquid nitrogen and stored at −80 °C until the trace mineral analysis.

In the nursery period, BW of each piglet and pen feed consumption were recorded at days 0, 6, 13, 20, and 27 postweaning for calculation of average daily gain (ADG), average daily feed intake (ADFI), and gain-to-feed ratio (G:F). The fecal score was recorded every day for the entire experimental period using a 4-scale fecal score system (1 = normal, 2 = soft, looser than normal feces, slight diarrhea, 3 = moderate diarrheic feces, and 4 = liquid, severe diarrhea) by observing individual piglets in each pen and assessing signs of stool consistency in the pen. Blood samples from 6 representative piglets (1 barrow and 1 gilt per pen having average BW within each pen) were collected from jugular vein into K_3 EDTA tubes at weaning, days 6, 13, and 27 postweaning, and analyzed for complete blood count. Blood samples were also collected into vacutainer trace element blood collection tubes with serum clot activator, and serum samples were separated by centrifugation at 2,500 × *g* for 25 min at 4 °C and stored at −80 °C until the analysis. Six serum samples from each treatment were analyzed for trace mineral content.

Obj:
- The effect of 2nd iron injection
- Iron in the diet



Trt − 1, 2, 3, 4
2x2
2° Injection < Y / N
Iron Diet < Y / N

$$y_{ijk} = \mu + I_j + D_k + (ID)_{jk} + b_i + \varepsilon_{ijk}$$

MATERIALS AND METHODS

Plot Design and Cultural Practices

The study was conducted in 1982 and 1983 at Davis, CA, on a Yolo loam, a deep, well-drained alluvial soil. Treatments were: N fertilized—irrigated (NI), N fertilized—dry (ND), no fertilizer N applied—irrigated (OI), and no fertilizer N applied—dry (OD) in a split-plot design of four replications with irrigation as the main plot. Subplots were 12.3 by 13.8 m, and all were fertilized with 60 kg P/ha broadcast as P_2O_5 at planting. Dry treatments began the season with a soil profile near field capacity throughout the potential rooting zone (due to winter rainfall and sprinkler irrigation at planting), but received no rainfall or supplemental irrigation during the growing season. Water was applied to furrow-irrigated treatments (NI, OI) every 7 to 12 d to replenish evapotranspiration losses. High N treatments received 180 kg N/ha as banded NH_4NO_3 at planting. Maize seeds (cv. Dekalb XL25A) were planted about 5 cm deep on 75-cm beds at a rate of 20 seeds/m, and thinned to 70 000 plants/ha after emergence.

Trt
2x2 factorial
N < Y / N
W < 7 / N

$$y_{ijk} = \mu + N_j + W_k + (NW)_{jk} + b_i + w_{k(i)} + \varepsilon_{ijk}$$

−93.87164° W), respectively. For simplicity, all locations are referred to by their corresponding county name (i.e., Dakota, Freeborn, and Sherburne). Field size ranged from 0.8 to 1.2 ha, and fields were typically surrounded by commercial soybean production fields (4–45 ha). Field locations represented a range of growing conditions typical of Minnesota. Plot size between locations ranged from 6.1 to 9.1 m in width (8–12 rows) and from 12.3 to 24.4 m in length, with a consistent row spacing across all locations of 76.2 cm (30.0 inches). Fallow ground of ≈3.0 m surrounded each plot to encourage uniform aphid colonization among plots within a location (DiFonzo et al. 1996, Hodgson et al. 2005). We allowed aphid populations to develop naturally so the within-plant spatial distributions would remain unaffected by artificially infesting plants (Hummel et al. 2004).

We tested the main treatment effects of planting date (PD) and maturity group (MG) on within-plant aphid distribution over multiple sample dates (SD). By staggering PD and using varieties in different MG, our experimental design simultaneously provided plants with different vegetative and reproductive growth stages on the same SD in a given location. We used a factorial experimental design at the Dakota and Freeborn locations with PD and MG as main effects; however, only the main effect of PD was used at the Sherburne location. Planting dates were typical for normal planting, replanting situations, and double cropped soybean, which in Minnesota often follows a pea crop (NASS 1997), and they were designated as early (5 May), mid- (18 May), and late (25 May and 13 June) plantings with a minimum of two PD per location spaced 2–3 wk apart. Soybean varieties included early (Pioneer 90M61), adaptive (Pioneer 91M70), and late (Pioneer 93M96) maturities, with group numbers 0.6, 1.7, and 3.9, respectively. Maturity