

Forage Nutritive Value and Mineral Concentrations of Common Pasture Forbs

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Introduction

- Forbs are broad-leaved, non-woody, herbaceous plants that can serve as a high quality source of forage for grazing livestock
- While often considered 'weeds', many forbs are readily consumed by livestock and may serve as an additional source of forage, particularly in pasture-based systems (Figure 1)
- Forbs are sometimes touted as mineral accumulators, taking up additional minerals from the soil that are then present in the forage and able to be consumed by grazing livestock

Figure 1. Sheep grazing chicory in mixed-species pasture (top left), cattle grazing pigweed patch in heavy use area (bottom left), and before and after of goats grazing Canada thistle patch in pasture (top right; bottom right)



Objective

To assess the forage nutritive value and mineral concentrations of common pasture forbs compared to traditional grass species

Materials and Methods

- Utilized two existing mixed-species pastures on a grass-fed dairy farm in Washington County, Maryland (Figure 2)
- Species collected included orchardgrass (grass control) along with six common pasture forbs (Figure 3)
- Sample collection
 - Sampled monthly from May through August 2025
 - Samples collected within a 50 foot radius at each site
 - Each species individually hand-sampled and analyzed
 - Fresh samples immediately delivered to commercial lab for analysis
- Forage analysis
 - Completed via wet chemistry by a commercial forage testing lab
 - Forage nutritive value: CP, NDF, ADF, TDN
 - Mineral concentrations: Ca, P, Mg, K, Na, Fe, Mn, Zn, Cu
- Data analyzed using mixed model analysis (significance at $P \leq 0.05$)

Figure 2. Dairy herd grazing on mixed-species pasture in Washington County, MD



Figure 3. Forage species tested for forage nutritive value and mineral concentrations included (from left to right): orchardgrass, burdock, Canada thistle, chicory, curly dock, dandelion, and broadleaf plantain



Results

Forage Nutritive Value (Figure 4):

- CP was greater for burdock, Canada thistle, and curly dock (> 26%) compared to orchardgrass (21%)
- NDF was lower for all forbs (< 37%) compared to orchardgrass (56%)
- ADF was lower for most forbs (< 22%) compared to orchardgrass (30%)

Mineral Concentrations (Figure 5):

- Ca concentrations were highest in Canada thistle and plantain (> 2.4%) and least in orchardgrass (0.4%)
- P was greater for dandelion (0.41%) compared to orchardgrass (0.29%)
- Mg was greater for curly dock (0.64%) compared to all other species (< 0.35%)
- K was greater for dandelion and chicory (> 4.6%) compared to plantain and orchardgrass (< 3.5%)
- Cu was greatest for Canada thistle (23 ppm) and least for curly dock (12 ppm)
- Zn was greater for chicory (45 ppm) compared to orchardgrass (26 ppm)
- Mn was greater for curly dock (141 ppm) compared to plantain and orchardgrass (< 85 ppm)

Figure 4. Forage crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF) concentrations in orchardgrass and six common pasture forbs

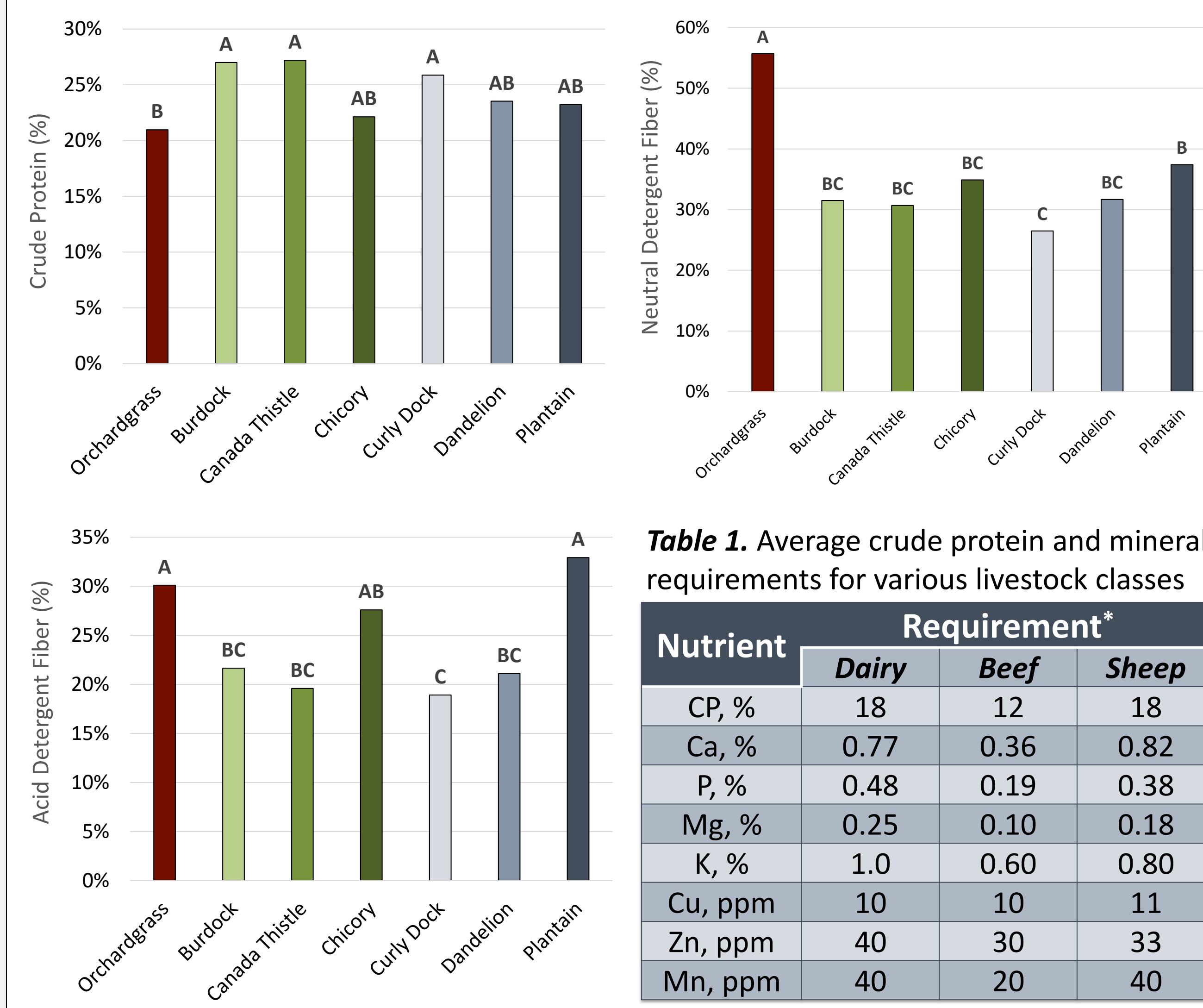
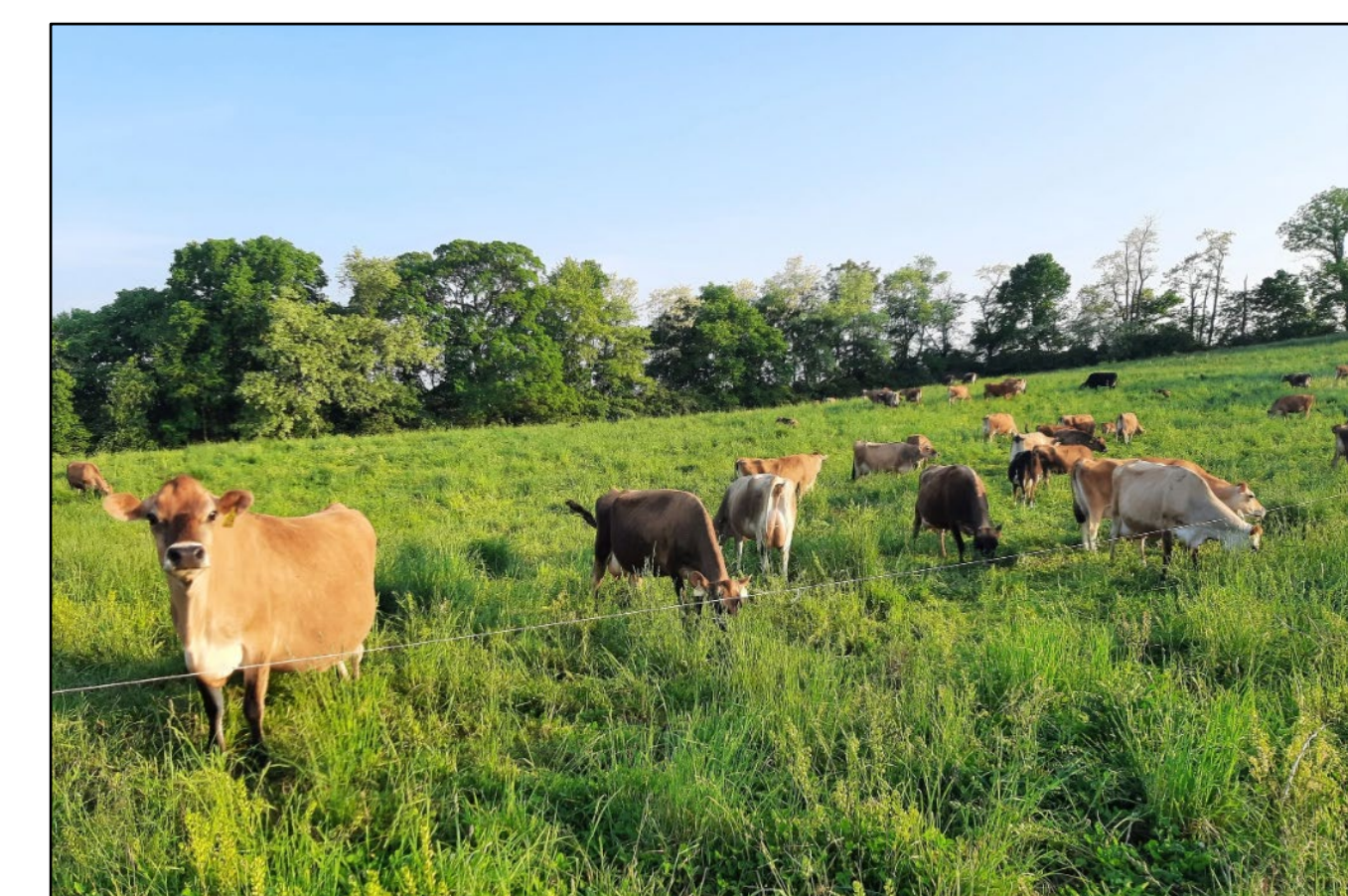
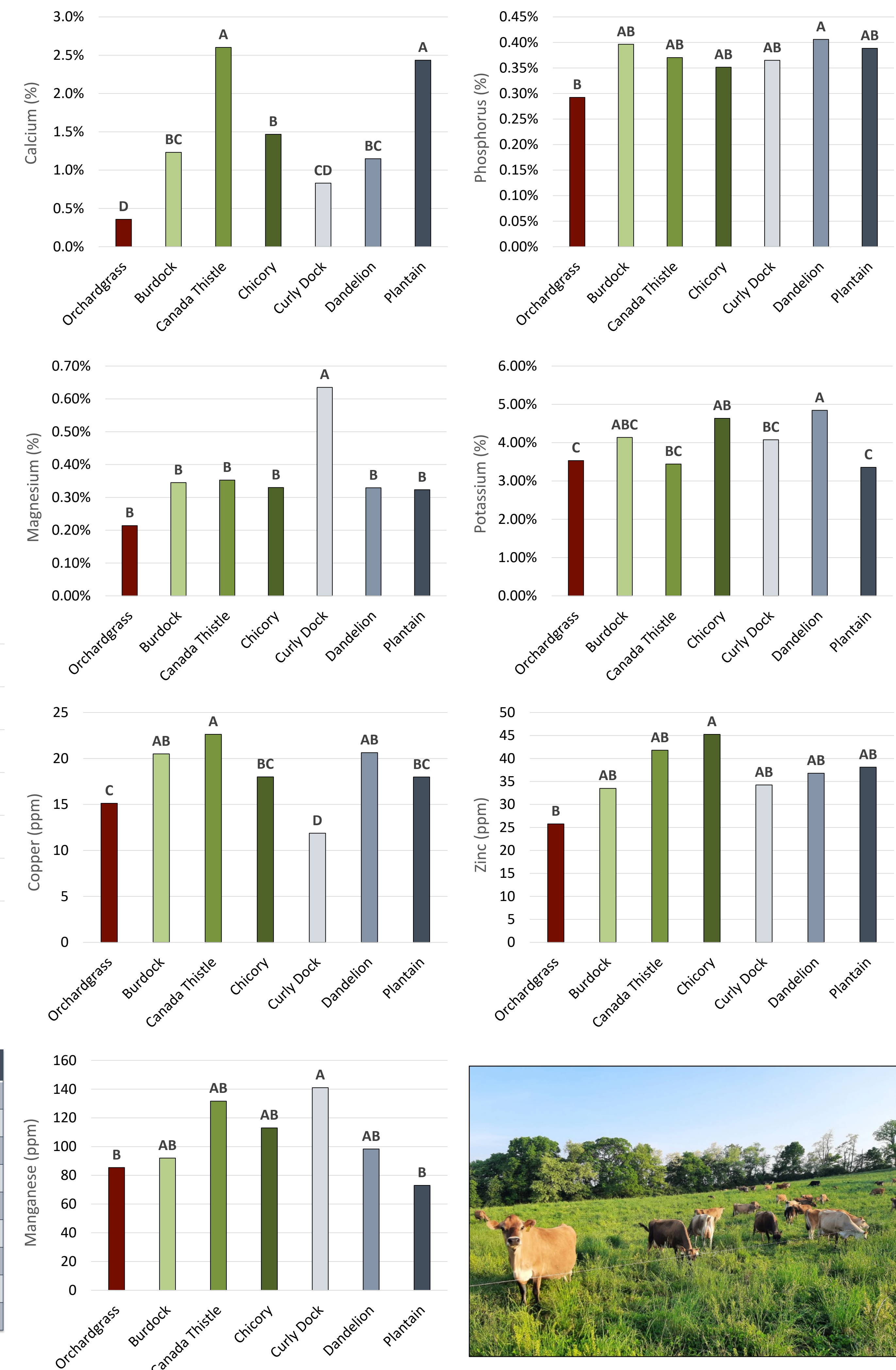


Figure 5. Forage calcium (Ca), phosphorus (P), magnesium (Mg), potassium (K), copper (Cu), zinc (Zn), and manganese (Mn) concentrations in orchardgrass and six common pasture forbs



Forbs can be a high-protein, low-fiber forage source with equal to or greater mineral concentrations compared to grasses like orchardgrass