



Effect of cutting height on the nutritive value, dry matter yield, and fermentation profile of whole-plant corn forage and silage through a meta-analysis

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Introduction

- Manipulating cutting height during corn silage harvest can affect corn silage nutritive value

Greater DM yield, NDF,
ADF, lignin, uNDF

Greater starch and NDFD





Introduction

- Within the next several years, BMR hybrids will be phased out
 - Increasing cutting height may be a good replacement for BMR corn silage
 - Greater fiber digestibility like BMR hybrids
 - Unlike BMR, greater cutting height increases starch concentration



Introduction

- Further research needed to evaluate tradeoffs and improve decision making

- Other factors may interact with cutting height and affect responses
 - Maturity at harvest also affects nutritive value
 - Potential for interaction between cutting height and maturity at harvest (Neylon and Kung, 2003)



Objective

The first objective of this study was to evaluate the effect of cutting height on the nutritive value, DM yield, and fermentation profile of whole-plant corn forage and silage. A secondary objective was to evaluate the effect of cutting height on these variables in different categories of DM at harvest.

Hypothesis

We hypothesized that increasing cutting height would improve nutritive value by increasing starch concentration and NDFD at the expense of DM yield. Additionally, we hypothesized that there would be different responses to cutting height in different DM categories.



Materials and Methods

- A literature search was conducted using Google Scholar, PubMed, and Science Direct to identify studies evaluating cutting height in corn forage or silage published from 1990 to 2024
 - Studies must:
 - Report cutting height treatments
 - Report nutrient composition
- Data from 33 publications met the criteria



Materials and Methods

- Data from 31 publications reported DM at harvest
- Data were classified as:
 - LO: $\leq 32\%$ DM (42 observations from 15 studies)
 - AVG: 32 to 37% DM (52 observations from 14 studies)
 - HI: $\geq 37\%$ DM (29 observations from 9 studies)



Materials and Methods

- Data from the full dataset and each of the DM categories at harvest were analyzed for the effect of cutting height
 - Linear and quadratic effects evaluated
 - Random effect of treatment (not cutting height) within study
 - Observations weighted by inverse of the SEM
 - Unstructured, compound symmetry, or variance components covariance structure used, whichever provided best fit by AICC
 - Significance declared when $P \leq 0.05$



Results

Table 1. Effect of cutting height on the nutrient composition of whole-plant corn forage and silage

Item	Intercept	SE	Coefficient	SE	P - Value
DM, % as fed	33.3	0.48	0.05	0.01	0.001
CP, % as fed	7.5	0.17	0.01	0.001	0.001
NDF, % DM	48.2	0.81	-0.09	0.01	0.001
NDFD, % NDF	54.8	2.08	0.08	0.02	0.001
ADF, % DM	26.1	0.50	-0.08	0.004	0.001
Lignin, % DM	3.7	0.22	-0.01	0.002	0.001
uNDF, % DM	12.4	0.98	-0.05	0.01	0.01
Starch, % DM	25.6	1.09	0.09	0.01	0.001
Ash, % DM	4.3	0.22	-0.01	0.002	0.001
DM Yield, Mg/ha	17.3	0.76	-0.06	0.01	0.001



Results

Table 2. Effect of cutting height on the nutrient composition of whole-plant corn forage and silage for different DM categories at harvest

Item	Intercept	SE	Coefficient	SE	P - Value
<u>NDFD, % NDF</u>					
LO DM	54.6	5.78	0.09	0.02	0.001
AVG DM	54.4	3.51	0.07	0.02	0.01
HI DM	53.2	2.99	0.12	0.04	0.03
<u>Starch, % DM</u>					
LO DM	23.0	3.17	0.10	0.02	0.001
AVG DM	27.7	1.91	0.04	0.01	0.001
HI DM	27.7	2.12	0.07	0.02	0.01



Conclusions

- Cutting height did not affect fermentation profile (data not presented)
- Increasing cutting height increased starch concentration and NDFD (depending on at DM harvest), increasing energy potential
 - Decreased NDF, ADF, uNDF, and lignin
- Increasing cutting height also decreased DM yield



Future Directions

- Further research warranted to evaluate dairy cow productivity
 - Only four studies identified

- Further research warranted to evaluate potential interactions with other management strategies
 - Planting density, kernel milk line, hybrid relative maturity, etc.



Acknowledgements





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Questions?