# The relationship between weather variables and dry matter intake in beef steers.



Introduction

- The NRC models are not well suited for dry matter intake prediction for cattle in extreme cold areas like the northern plains of the United states where temperature fall below 0°C.
- The objective is to examine the relationship between weather variables and dry matter intake to increase the accuracy of dry matter intake prediction models.

## Materials and Methods

- Data from 790 beef steers from 10 experiments conducted between years 2011 to 2017 were condensed to weekly averages (n=13895 steer-weeks).
- Mixed procedure of SAS was used to assess the fit of our model using Toeplitz covariance structure for covariates.



M Yusuf, K C Swanson, L L Hulsman Hanna, M L Bauer

Department of Animal Sciences, North Dakota State University, Fargo, ND.

Results

Significant weather variables affecting dry matter intakeVariableCoefficientF-valueP-valueBase model27.960.0001Week of the year27.960.0001Body weight (kg)0.05539527.890.0001Quadratic effect of body weight (kg)-0.00004334.430.0001Dietary energy density (NEm)9.625439.940.0001Quadratic effect of NEm-2.885757.020.0001Weeks lag of maximum temp. (°C)-0.1896233.800.0001Two weeks lag of ambient temp. (°C) × monthly lag of wind speed (km/h)0.04051148.780.0001Two weeks lag of solar radiation (W/m²)0.00624470.660.0001Absolute minimum temp. (°C) × absolute dew point (°C)0.0149039.300.0001Two weeks lag of solar radiation (W/m²) × absolute dew point (°C)-0.007425.580.0001Mostly lag of wind speed (km/h)-0.110925.240.0001Two weeks lag of solar radiation (W/m²) × absolute dew point (°C)-0.110925.240.0001	RESUILS				
Base model         27.96         0.0001           Body weight (kg) $0.05539$ $527.89$ $0.0001$ Quadratic effect of body weight (kg) $-0.00004$ $334.43$ $0.0001$ Dietary energy density (NEm) $9.6254$ $39.94$ $0.0001$ Quadratic effect of NEm $-2.8857$ $57.02$ $0.0001$ Weather $-2.8857$ $57.02$ $0.0001$ Two weeks lag of maximum temp. (°C) × monthly lag of wind speed (km/h) $-0.1896$ $233.80$ $0.0001$ Two weeks lag of solar radiation (W/m <sup>2</sup> ) $0.006244$ $70.66$ $0.0001$ Absolute minimum temp. (°C) × absolute dew point (°C) $0.1490$ $39.30$ $0.0001$ Two weeks lag of solar radiation (W/m <sup>2</sup> ) × absolute dew point (°C) $0.01703$ $45.12$ $0.0001$ Absolute dew point (°C) $0.1490$ $39.30$ $0.0001$ Two weeks lag of solar radiation (W/m <sup>2</sup> ) × absolute dew point (°C) $-0.00074$ $25.58$ $0.0001$ Mosthly lag of wind speed (km/h) $-0.1954$ $17.82$ $0.0001$	Significant weather variables affecting dry matter intake				
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Two weeks lag of solar radiation $(W/m^2)$ x absolute minimum	Absolute minimum temp. (°C)	-0.1109	25.24	0.0001	
Two weeks lag of solar radiation $(W/m^2)$ x absolute minimum	Monthly lag of wind speed (km/h)	-0.1954	17.82	0.0001	
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# NDSU NORTH DAKOTA STATE UNIVERSITY

#### Discussion

The table shows the variables in our base model which are; week of the year, the linear and quadratic effects of body weight and energy density. It also shows the Important weather variables and their interactions that were significant in our model. Most of these weather variables interact with each other to affect dry matter intake and their interactions were important (P<0.05).

## Conclusion

Weather variables interact with each other and these variables affect dry matter intake in beef steers. This will help in improving the models we currently have for better dry matter intake predictions.

#### References

National Research Council. 2001. Nutrient Requirements of Beef cattle. (7th ed.). Nutrient requirements of domestic animals. National Academy Press, Washington, DC.