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

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

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

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.

Results

Significant weather variables affecting dry matter intake

Variable	Coefficient	F-value	P-value
Base model			
Week of the year		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			
Two weeks lag of maximum temp. (°C)	-0.1896	233.80	0.0001
Two weeks lag of ambient temp. (°C) × monthly lag of wind speed (km/h)	0.04051	148.78	0.0001
Two weeks lag of solar radiation (W/m^2)	0.006244	70.66	0.0001
Absolute minimum temp. (°C) × absolute dew point (°C)	0.001703	45.12	0.0001
Absolute dew point (°C)	0.1490	39.30	0.0001
Two weeks lag of ambient temp.(°C)× absolute dew point (°C)	-0.00195	38.14	0.0001
Two weeks lag of solar radiation (W/m^2) × absolute dew point (°C)	-0.00074	25.58	0.0001
Absolute minimum temp. (°C)	-0.1109	25.24	0.0001
Monthly lag of wind speed (km/h)	-0.1954	17.82	0.0001
Two weeks lag of solar radiation (W/m^2) × absolute minimum temp. (°C)	0.000370	8.15	0.0043

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.