# Research Roundup

## Researchers evaluate environment-animal interactions.

*Compiled by Shauna Hermel, editor*

### Matching cows to the environment

Kansas State University (K-State) researchers evaluated the environmental effect and efficiencies of beef cattle of differing genetic potential in the Great Plains by simulating a 100-head cow-calf herd grazing 74 different land regions. They looked at six combinations of genetic potential — large, moderate or small mature size and high [24.2 pounds (lb.) per day] or low (17.6 lb. per day) milk production.

"The simulation determined the average amount of feed required to maintain the herd," said Andrew Lakamp, graduate student focused on sustainability of beef cattle, in the K-State *2022 Cattlemen's Day Report*.

The researchers estimated land, water and methane production for each combination (see Table 1). Weaning weight was estimated for each genetic potential to estimate resource use efficiency.

"Animals with greater energy requirements have larger environmental footprints," Lakamp said. "However, in environments where nutritional availability is not restricted, small, high-milking cattle likely have the smallest environmental footprint per pound of weaned calf."

### How does the weather affect dry-matter intake?

Researchers at North Dakota State University (NDSU) looked at how weather variables (ambient temperature, the range in temperature, solar radiation, dew point and wind speed) affect dry-matter intake (DMI) of beef steers. In the *2021 North Dakota Livestock Research Report,* Mustapha Yusuf, Kendall Swanson, Lauren Hulsman Hanna and Marc Bauer reported that these weather variables and their interactions accounted for 44.9% of variation in DMI of beef steers after accounting for body weight, dietary energy density and time of year.

The researchers reviewed the intake data of 790 steers collected through an Insentec feeding system from 2011 to 2017. Results indicated:

Ambient temperature and the range in temperature interacted to influence DMI. At cold temperatures with high fluctuations in temperature, DMI decreased. At high temperatures and higher fluctuations in temperature, DMI increased.

Low temperature fluctuations in either cold or hot weather had minimal effect on DMI.

"This shows that seasons with higher fluctuation in temperature will have a greater effect on DMI of beef steers," noted the researchers.

While temperatures below 0° F when the wind was minimal caused only a small decrease in DMI, those temperatures accompanied by a high wind speed produced a large negative effect on DMI.

When temperatures were above 0°, DMI increased with increasing temperature and wind speed. However, high temperature and lower wind speed had minimal effect.

Cold and dry (lower dew point) had a negative effect on DMI. High temperatures with drier air had a positive effect on DMI, but as the dew point increased at higher temperatures, DMI decreased. The researchers reason that at high temps with high humidity, an animal's ability to dissipate heat is reduced. Steers reduce DMI to reduce metabolic heat production.

DMI increased on cold, sunny days, but decreased on hot, sunny days.

As temperatures increase, dry air had a positive association with DMI. However, as the temperature fluctuated more, a high dew point reduced DMI.

DMI decreased with more sun and wind, said the researchers. "This suggests that when the air is hotter than the animal's body, more wind speed increases the temperature of the animal's body rather than dissipate heat, thereby increasing the heat load and resulting in decreased DMI." ABB

**Table 1: Avg. annual environmental effect per pound of weaning weight (WW) of a 100-head cow-calf herd with differing genetic potentials in the Great Plains**

| Genetic potential[1] | Grazing land | Crop land | Total land | Drinking water | Irrigation water | Total water | Methane |
|---|---|---|---|---|---|---|---|
| | ---------- Acres/lb. WW ---------- | | | -------- 1,000 gallon/lb. WW -------- | | | Lb./lb. WW |
| **Large weight** | | | | | | | |
| High milk | 0.0252 | 0.0022 | 0.0275 | 0.0066 | 0.1192 | 0.1258 | 0.3013 |
| Low milk | 0.0269 | 0.0022 | 0.0291 | 0.0068 | 0.1165 | 0.1233 | 0.3117 |
| **Moderate weight** | | | | | | | |
| High milk | 0.0237 | 0.0022 | 0.0259 | 0.0065 | 0.1175 | 0.1240 | 0.2939 |
| Low milk | 0.0253 | 0.0022 | 0.0275 | 0.0067 | 0.1145 | 0.1212 | 0.3017 |
| **Small weight** | | | | | | | |
| High milk | 0.0221 | 0.0022 | 0.0243 | 0.0064 | 0.1155 | 0.1219 | 0.2851 |
| Low milk | 0.0237 | 0.0021 | 0.0258 | 0.0066 | 0.1127 | 0.1193 | 0.2917 |

SOURCE: Kansas State University *Cattlemen's Day 2022 Research Report.* [1]Weight (large, moderate and small) was parameterized for each herd using data from regional surveys of cattle producers. Low lactation potential was designated 17.6 lb. milk/day at peak lactation; high lactation potential was 24.2 lb. /day at peak lactation.