

TURNING INFORMATION INTO PROFITS



AGRONOMIC ISSUE: **SNOW - Pro's and Con's**

- Snow is a two edged sword, at the right time it has tremendous benefits, but at the wrong time and amount it can cause significant management issues.
- Another important fact to note, is that all snow is not created equal. Most people use the 10:1 rule, that is 10 cm of snow equals 1 cm of liquid water, but this is just not the case. We can have very wet snow, with an extremely high water content, or very dry snow, that is light and fluffy, which is loved for skiing. This impacts the value of the commodity in different situations.
- **Snow Benefits:** Each inch of snow acts as an insulating blanket, protecting fall seeded crops from winterkill, which stops frost penetration into the soil and protects the soil from erosion. On the other hand, when there is little snow, frost penetration into soil is deep helping reduce soil compaction.



- **Snow Benefits:** Light fluffy snow has little in the way of snow equivalent water, while heavy wet snow can add significant moisture to the soil, improving yield potential. The lack of snow can also aid in reducing insect populations, allowing cold temperatures to penetrate deeply. Snow can also trap nitrogen, nitrate and ammonium from the atmosphere, free of charge, although amounts are not large.
- **Snow Risks:** Obviously snow can delay harvest operations, reduce quality and grade of crops. The lack of snow can cause deep frost penetration into soils, which can freeze soils and reduce infiltration in the early spring and cause winter kill in fall seeded crops or forages. Early snow in the season can be lost due to sublimation over the winter, meaning less water infiltrating the soil. Lack of snowmelt in the spring can cause shortages in dugouts and seed bed moisture for germination. Heavy snow and cold temperatures can also increase livestock feeding requirements.

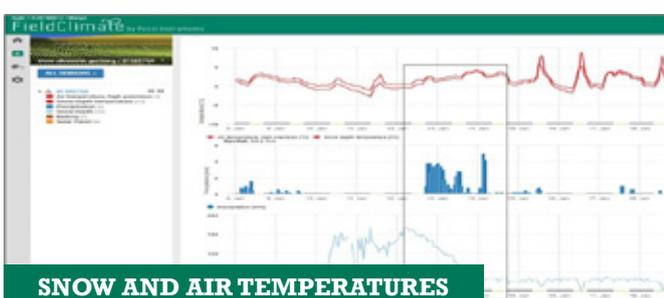
IoT SOLUTION:

In-field iMETOS ECO D3 station with Ultrasonic Snow Height Sensor and Site Specific Weather Forecast

- Track snow depth on the field with the ultrasonic snow height sensor and combine with a rain bucket to capture both liquid and frozen precipitation
- Know the air and snow temperatures for freezing and thawing periods (graph below)
- Use site specific forecast for both liquid and snow amounts and probabilities (Hourly updated) (second graph) for work planning



iMETOS ECO D3 ULTRASONIC SNOW



SNOW AND AIR TEMPERATURES



LIQUID AND SNOW AMOUNTS

Cost Benefits:

Not all SNOW is created equal

As discussed snow can have both benefits and risk to agricultural production: too little snow and the concern for fall seed or perennial crops is winterkill. The lack of snow amount is also a concern for recharge in the spring of both dugouts and seedbed moisture. Overall, soil moisture is the crops gas tank and knowing total soil moisture allows for selection of crops and fertility plans.

The timing and amount water held in the snow can really hamper or enhance on-farm production. Late season, heavy snow can significantly delay field operations in spring. With a late season, high water content snowfall, field operations can be delayed 7 to 14 days. The water held in this type of snow is not the 10 to 1 ratio, but more in the range of 3 to 5:1 (3 or 5 cm of snow to 1 cm of liquid water), which can dramatically improve seed bed and subsurface soil moisture if the soils thawed. For livestock, heavy snow and cold temperatures drive up food rations and put further pressure on the calving season.

What does all this mean: Even though the bulk of farm operations have slowed during the winter, the importance of snow for agronomic and animal welfare remains very important. Lack of snow cover can result in major winterkill and poor meltwater for spring soil moisture recharge, which reduces the potential for income. Heavy snow can adversely impact livestock and calving season, while the snowmelt is welcome for spring soil moisture and improved yield potential. This can translate into thousands of dollars of lost or improved income on a farm today.

Voice of the Grower

Knowing snow cover and the total water balance on my farm has allowed us to select our crops and plan fertility options.

We spent about \$7,000 on our three METOS IoT snow solutions and earn money even in dry Winters by saving fertilizer and application costs on winterkilled crops, but in snowy years maximized the return by increasing our chances of increase yields based on knowing the total water balance on the farm.

Our return on investment range from breaking even in dry years to over 6:1 in wet years.

