

Dalhart Feedlot Fog/Haze Study

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June 22, 2011

Why Study?

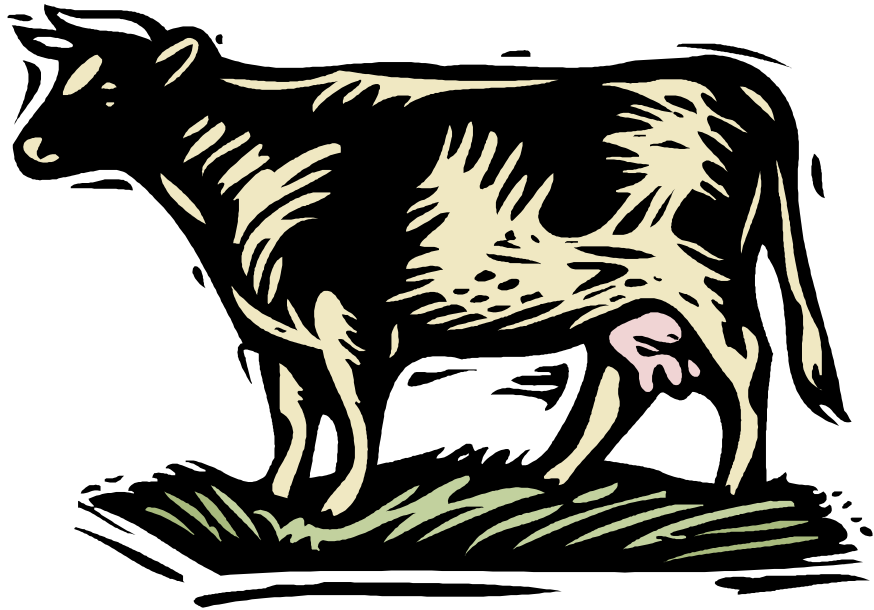
- KDHT has been experiencing haze/fog with very dry air in place mainly in the evening and early morning hours without knowing the exact cause.
- Figure out why and when this haze/fog is occurring to better service our aviation customers and improve TAF verification

The Problem

```
SPECI KDHT 180417Z AUTO 23009KT 3SM HZ CLR 22/M08 A2979 RMK AO2 $  
SPECI KDHT 180342Z AUTO 22006KT 1 1/4SM HZ FEW002 23/M08 A2978 RMK AO2  
$  
SPECI KDHT 180325Z AUTO 23008KT 2SM HZ FEW002 24/M09 A2978 RMK AO2 $  
SPECI KDHT 180305Z AUTO 23009KT 1 3/4SM HZ FEW002 24/M09 A2977 RMK AO2  
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SPECI KDHT 180238Z AUTO 22008KT 2 1/2SM HZ FEW110 27/M10 A2976 RMK AO2  
$  
SPECI KDHT 180226Z AUTO 22009KT 1 3/4SM HZ FEW110 27/M10 A2976 RMK AO2  
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SPECI KDHT 180026Z AUTO 23014KT 10SM SCT110 37/M12 A2974 RMK AO2 WSHFT  
0006 $
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T01720050  
METAR KDHT 220553Z AUTO 07008KT 10SM CLR 18/05 A3004 RMK AO2 SLP116  
T01830050 10300 20183 403110111 53011  
METAR KDHT 220453Z AUTO 07008KT 10SM CLR 19/06 A3002 RMK AO2 SLP110  
T01940061  
METAR KDHT 220353Z AUTO 07008KT 3SM HZ CLR 21/07 A3000 RMK AO2 SLP107  
T02060072  
SPECI KDHT 220348Z AUTO 07008KT 2 1/2SM HZ CLR 21/07 A3000 RMK AO2  
METAR KDHT 220253Z AUTO 08009KT 8SM CLR 23/07 A2997 RMK AO2 SLP093  
T02330072 53012  
METAR KDHT 220153Z AUTO 08006KT 10SM FEW110 25/09 A2996 RMK AO2 SLP088  
T02500089  
METAR KDHT 220053Z AUTO 09008KT 10SM BKN100 29/07 A2994 RMK AO2 SLP083  
T02940067
```

The Problem



???

Data Used in this Study

- Examined all METAR observations at KDHT 00z January 1, 2010 through 12z June 22, 2011
- Looked for observations with reduction to MVFR (5SM visibility or less or 3000 ft AGL or less) or lower conditions that were NOT likely attributed to precipitation, blowing dust, or saturation due to high moisture content
- Found 40 Total Events with one or more observations meeting the criteria above

Findings

- 40 Total Events
 - 4 in April 2010
 - 4 in May 2010
 - 1 in September 2010
 - 3 in October 2010
 - 1 in November 2010
 - 1 in January 2011
 - 9 in April 2011
 - 8 in May 2011
 - 9 in June 2011
- Events occurred mainly in the growing season.
- Dry ground conditions seem to be necessary. (An event occurred on average 12 days after the last measurable precipitation of 0.01” or more.)

Total Event Findings

- **40 Total Events**
 - **28 (70%) categorized as occurring after sunset (00-06z)**
 - **21** of these 28 (**75%**) occurred with mainly a **southwest wind** (**180-270°**)
 - 4 of these 28 (14%) occurred with mainly a northwest wind (270-360°)
 - 2 of these 28 (7%) occurred with mainly an east wind (070-090°)
 - **9 (23%) categorized as occurring near sunrise (11-16z)**
 - **7** of these 9 (**78%**) occurred with mainly a **southwest wind** (**180-270°**)

For All 40 Events

– **Average Wind: 240° 9 kts**

- All cases occurred with winds 13 kts or less

– **Average Duration of MVFR or lower: 85 minutes**

- Longest duration is 180 minutes

– **Peak Time of Occurrences**

- **For After Sunset Events: 0320z**
- **For Near Sunrise Events: 1400z**

IFR or Lower Events - 24 of 40 (60%) Events

- **Average Wind: 240° 9 kts**
 - All cases occurred with winds 12 kts or less
- **Average Duration of IFR or lower: 31 minutes**
 - Longest duration of IFR or lower is 111 minutes
- **Peak Time of Occurrences**
 - **For After Sunset Events: 0320z**
 - **For Near Sunrise Events: 1308z**
- Includes one LIFR event which occurred around 03z for 8 minutes with a surface wind of 240° 7 kts.

Possible Explanation



KDHT in Yellow
Feedlots in Red

Additional Explanation



According to Pat, the General Manager, at Cargill Cattle Feeders in Dalhart in regards to cattle activity:

- During the late evening hours during the warm season, cows are more active and move around more outdoors when it is cooler just before they sleep.
- The same is true during the morning hours near sunrise after they wake up.
- Cows continuously eat and drink throughout the day.

KDHT in Yellow

Cargill Cattle Feeders in Red

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Conclusion/Lessons Learned

- **MVFR or lower fog/haze may briefly develop near KDHT during dry periods for a 1-2 hour time frame in the evening around 03z just after the nocturnal inversion develops and again near sunrise around 14z.**
- **Look for:**
 - **Light southwest surface winds (200-270°) 12 kts or less** or possibly northwest (300-350°) or east surface winds (070-090°) 12 kts or less
 - **Dry ground conditions**

