# Evaluation of Two Organic Acid Pre-Post Milking Teat Dips on Teat Health and Condition in a Commercial Herd

## A.S. Leaflet R3079

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**Summary and Implications**

An eight week trial was conducted at a commercial dairy to evaluate the teat conditioning efficacy of two organic acid formulas when used pre and post-milking. Teat skin and teat end roughness was scored for each teat twice/weeks. Peeling of teat skin was also evaluated. A total of 26 cows were scored during the study period, but only 17 cows had full records for analyses. Results showed that while the control product maintained optimum teat skin condition, some quarters showed teat end skin peeling. There were no differences between products in teat end condition and it was observed that teat end condition improved over time for both products. It was concluded that F-9343+592-001-1 and CHD Conc+592-001-1 had similar teat end condition efficacy properties, but F-9343+592-001-1 had an increased number of teats with skin peeling at the teat ends during the trial.

**Introduction**

Teat dipping with effective products is a critical control point for mastitis prevention, from a germicidal standpoint as well as excellent teat health and conditioning. This trial was designed to compare the teat conditioning properties of 2 experimental organic acid teat dip formulas for pre and post milking teat dipping over an 8 week period.

**Materials and Methods**

**Test site and farm management:** The Kirk Christie Dairy is a tie stall barn (24 stalls with water beds) located in Slater, IA, USA. Cows were milked two times a day with 4 milker units and a 2" pipeline (6" high). Milking equipment was tested using NMC protocols prior to trial initiation. The farm milking routine prior to trial included the use of a 500 ppm chlorine generating system (ECAcept, Ecalogix) pre-milking product, 30-45 second contact time, followed by drying teats with microfiber cloth towels. No forestripping was conducted. A sodium chlorite, lactic acid mixable dip (4XLA, Ecolab, Inc.) was normally used in the farm for post milking teat dipping before the trial. On average, 22 cows were milked per barn. Milkers were blinded as to the origin of the product.

**Trial and dips:** On average, there were 22 milking cows in the barn. The trial was a half udder design with left teats pre and post dipped with one experimental product, and right teats with the other experimental product (control). All pre-postmilking disinfectants were applied using a non-return dip cup. The main features of the formulas tested are shown in Table 1. Product A (CHD Conc + 592-001-1) was applied to left quarters while the control Product B (F-9343 + 592-001-1) was applied to right quarters of study cows. Both products had similar color, as the emollient package (592-001-1) made up the majority of volume in the teat disinfecting solution. During the test period, a total of 26 cows were dipped and scored for teat condition, but only 17 had complete information for all scoring records. In this report, only data from cows that had all scorings were analyzed.

**Teat skin and teat end health evaluations**: Data collection was initiated on June 13, 2015 and continued until August 14, 2015. Baseline data on teat end and teat skin health was observed twice prior to trial dips. Experimental organic acid pre-post dips were applied) at every milking (2X/ day) milking starting June 16 through August 9 (56 days). Teat condition evaluations were performed by the scorer immediately after the milking unit was removed and before the post milking solution was applied. Teat skin and teat end scoring were performed using a variation of the Goldberg and Timms methods, respectively, by trained graders (Tables 2 and 3). Scoring was performed two times per week. Data was entered into an Excel database. Results were compiled and analyzed using SAS.

**Statistical analysis:** Trial data was analyzed using descriptive statistics and an ordinal model for multinomial data (GENMOD procedure). A cow's quarter was the unit of study. The response variable was teat condition (and the covariates included treatment and scoring date. Post hoc comparisons were also made using least squares. Level of statistical significance was set at 0.05. All statistics were analyzed using SAS 9.3, Inc. (Cary, New York).

**Results and Discussion**

a) **Teat skin condition:** No statistical analyses could be conducted to evaluate differences between both products because teat skin condition of the experimental group (Product A) remained unchanged throughout the trial (score 1). However, as shown in Figure 1, some of the teats in the control group (Product B) scored 2 in four scoring dates. Teat skin peeling, including on teat ends, was also recorded during the trial but was only observed for the control group (Product B) as shown in Figure 2. Five tissue samples were sent to the Iowa State University Veterinary Diagnostic Laboratory for histopathology. Results confirmed the existence of layers of keratin cells and stratified squamous epithelium with some cells

exhibiting ballooning degeneration (Figure 3). Inflammation was not evident, but the changes correspond to a localized surface irritation.

b) **Teat end condition:** Teat end roughness of both groups is summarized in Figure 4. Data showed that overall there were no differences in teat end condition between both groups (P=0.994), but there were differences between scoring dates. Teat end condition improved for both groups over time (P<0.05). Teats with scores 2.5 (d) or 3 (e) were not observed after one week of product usage. Quarters with a teat condition score of 1 (a) or 1.5 (b) were 87.5% (Product A) and 85.3% (Product B) at the start of the trial. By the end of the study, teat end condition had improved and scores 1 and 1.5 were 96.9% (Product A) and 97.1% (Product B) (P<0.05).

c) **Weather:** The study was conducted under moderately warm temperatures (65-80$^0$F) (Figure 5).

**Overall Summary and Conclusion**

A trial was conducted at a commercial dairy to evaluate the teat conditioning efficacy of two organic acid teat dip formulas when used pre and post-milking. Teat skin condition was maintained at optimum levels for the whole duration of study in the experimental product. Teat end skin peeling was observed in some quarters treated with control product. Teat end condition (thickness and roughness) efficacy was not different between the test and experimental solutions. However, teat end condition improved and surpassed initial values in both groups.

Table 1. Products used in the study

| **Pre/Post milking** | Inducer A | Inducer B | Conditioner Package (CP) |
|---|---|---|---|
| Label ID | Green | Blue | Orange |
| Internal ID | CHD Conc | F-9343 | 592-001-1 |
| Color | Colorless | Colorless | Brown |
| Active ingredient | 13% OAD | 5% OAD | N/A |
| Emollient | N/A | N/A | 5% glycerin |

***Table 2.Teat Skin Scoring Scale***

| **Score** | **Description** |
|---|---|
| **0** | Teat skin has been subjected to physical injury ( stepped on/ frost bite) |
| **1** | Teat skin is smooth, soft and free of any scales, cracks, or chapping. |
| **2** | Teat skin shows some evidence of scaling especially when feeling (areas of dryness by feeling drag when sliding a gloved hand along the teat barrel &/or seeing areas of lower reflective sheen to the surface of the skin). |
| **3** | Teat skin is chapped. Chapping is where visible bits of skin are visibly peeling. |
| **4** | Teat skin is chapped and cracked. Redness, indicating inflammation, is evident. |
| **5** | Teat skin is severely damaged / ulcerated / open lesions. |

***Table 3. Teat End Scoring Scale* (0*- 5)**

| **Teat End Scoring system** | **Degree of hyperkeratosis or callousing** | | | | |
|---|---|---|---|---|---|
| **Cracking** | none | minor | mild | moderate | severe |
| No cracking | **1** | **1.5** | **2** | **2.5** | **3** |
| Cracked | **---** | **3.5** | **4** | **4.5** | **5** |

0* zero score – physical injury of teat not associated with trial

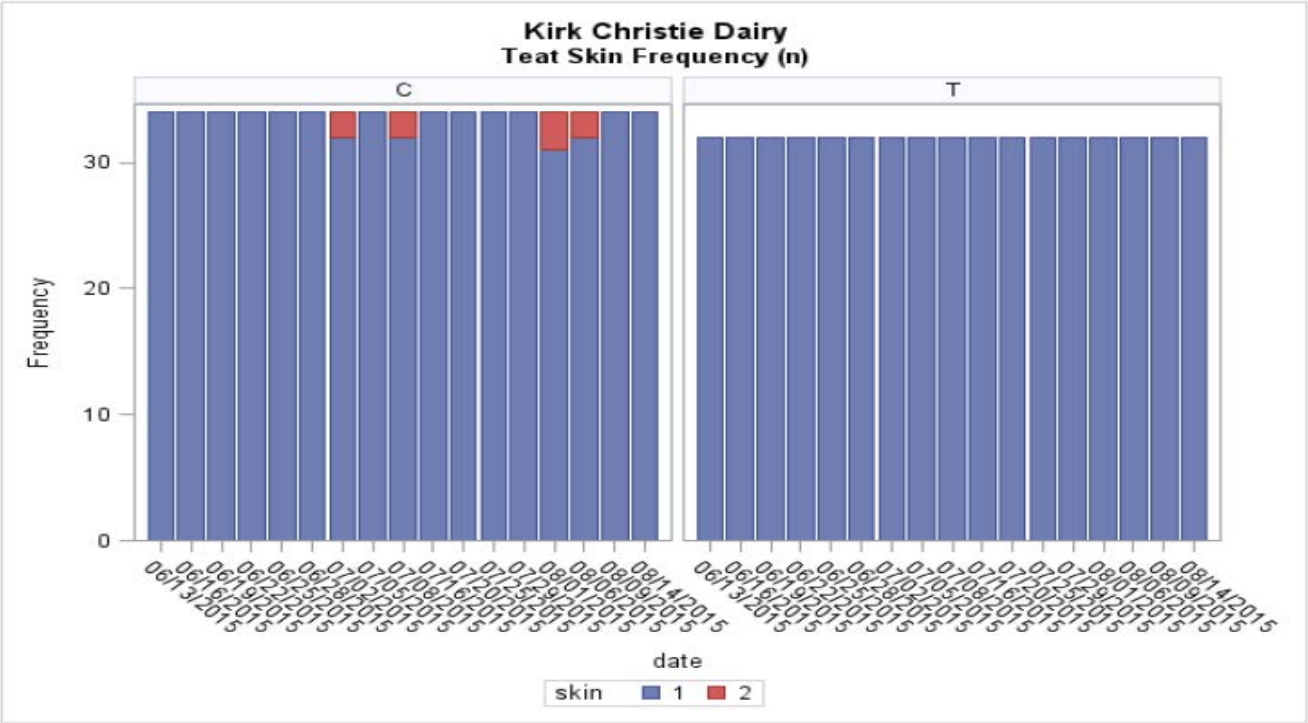


Figure 1. Frequency of teat skin condition in teats dipped with Product A (**T**: CHD Conc + 592-001-1) or Product B (**C**: F-9343 + 592-001-1) during the 8 week trial period.

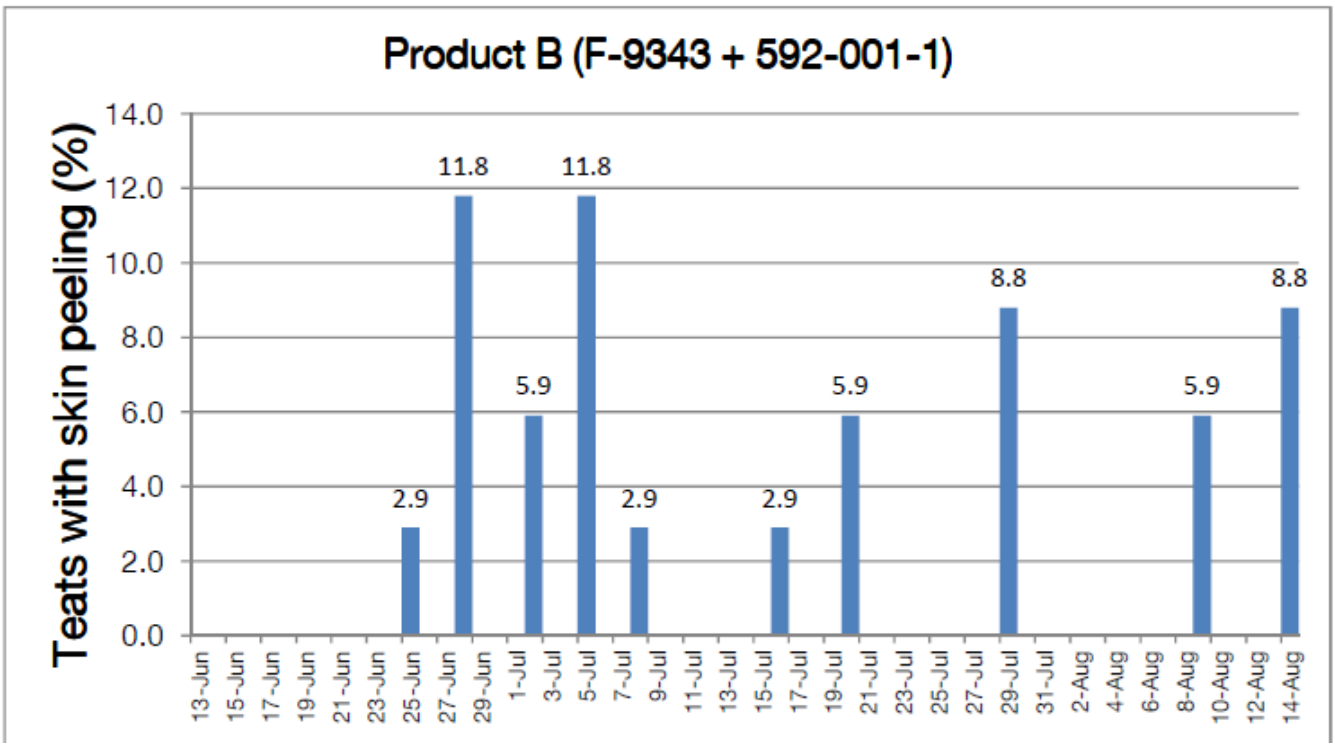


Figure 2. Proportion of teats treated with Product B (F-9343 + 592-001-1) showing teat end skin peeling during the 8 week trial period.

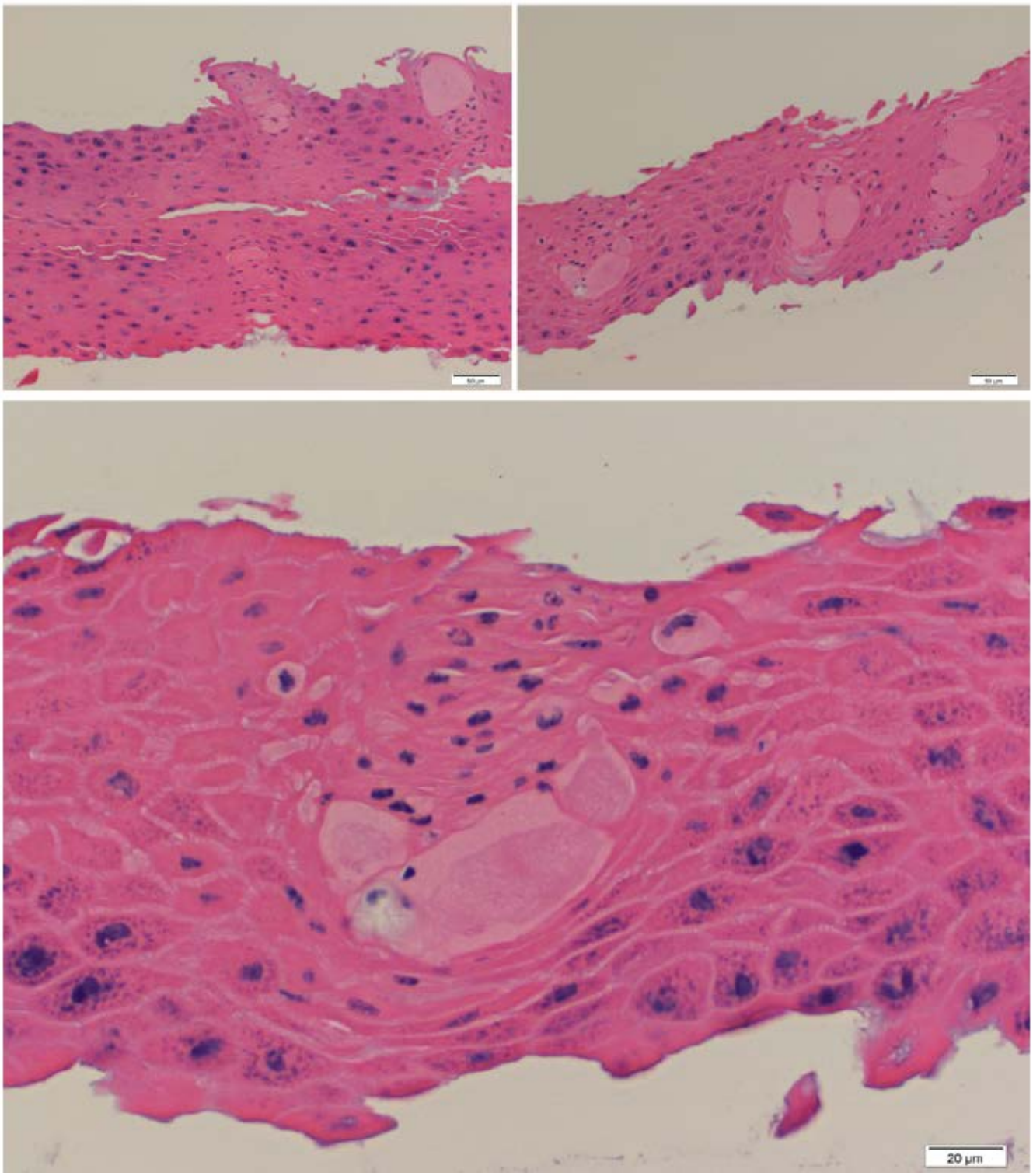


Figure 3. Microscope slides of Product B (F-9343 + 592-001-1) teat end skin tissue samples treated with hematoxylin and eosin. Diagnosis corresponds to epithelium ballooning degeneration and acute cell necrosis with only localized inflammation.

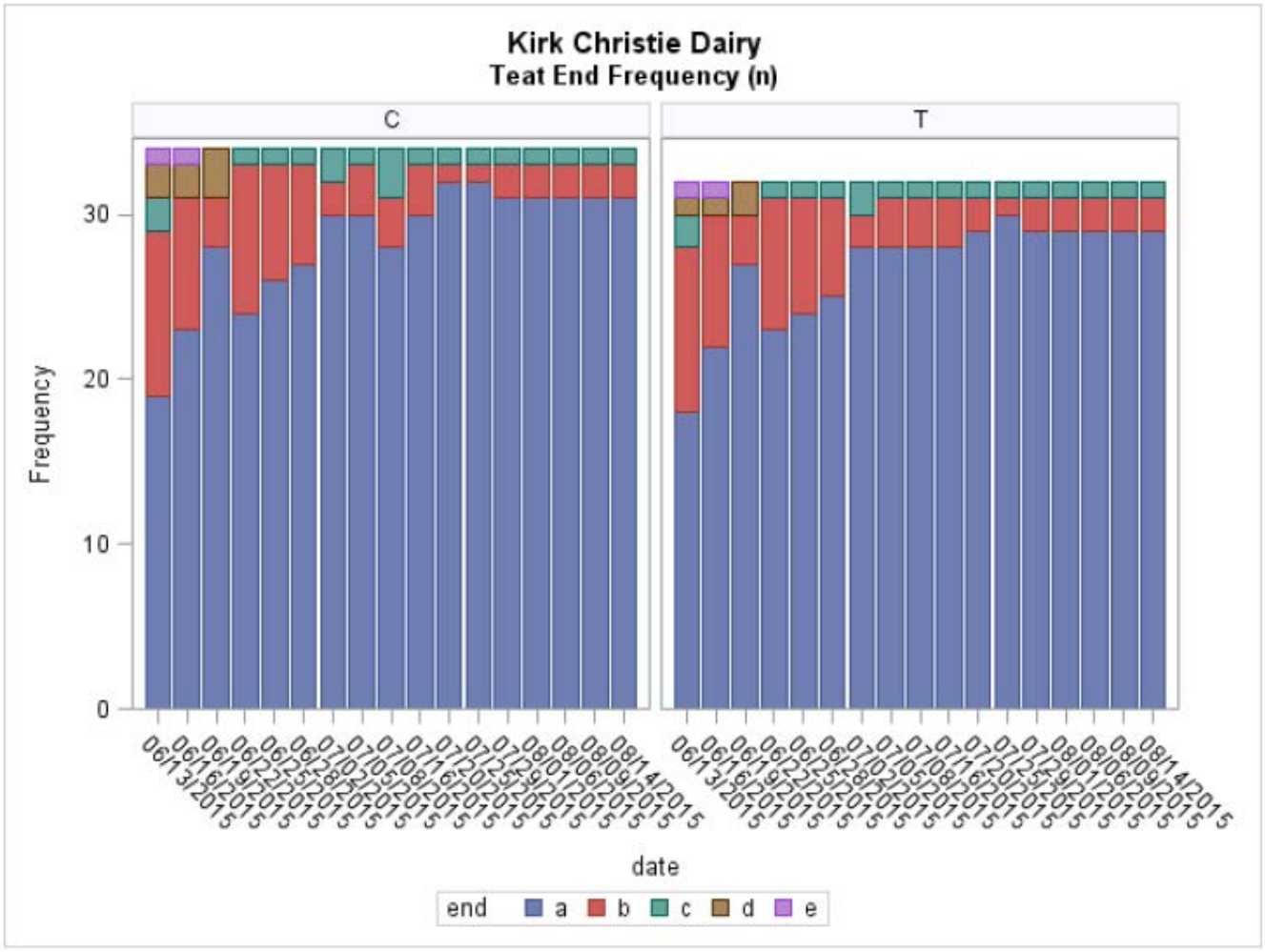


Figure 4. Frequency of teat end condition in teats dipped with Product A (T: CHD Conc + 592-001-1) or Product B (C: F-9343 + 592-001-1) during the 8 week trial period.
(a = score 1, b = score 1.5, c = score 2, d = score 2.5, e = score 3, f = score 3.5)

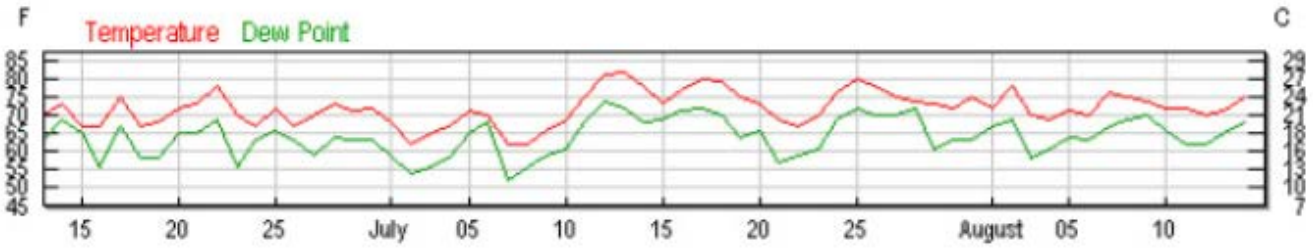


Figure 5. Temperature observed during the experimental period (Source: WeatherUnderground (www.wunderground.com))