DATA EVALUATION RECORD
HONEYBEES FIELD TEST
Apis mellifera
Non-Guideline Semi-Field and Residue Study

1. **CHEMICAL:** Clothianidin PC Code No.: 044309

2. **TEST MATERIAL: Clothianidin** Purity: 98.6% ai

3. **CITATION**

Author: Bocksch S; Werner S.

Title: Clothianidin Technical - Honey Bee Brood and Colony Level Effects Following Clothianidin Intake via Treated Pollen in a Field Study in North Carolina - USA 2017

Study Completion Date: January 12, 2018

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Laboratory Report ID: S17-02137

DP Barcode: 444283

MRID No.: 50478501

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6.. STUDY PARAMETERS

Test Species: Honeybees (*Apis mellifera* L., *Apis mellifera ligustica*)
Age of Test Organism at Test Initiation: Healthy colonies contained one queen with ~15,000 bees.
Test Duration: June 21, 2017 to October 18, 2017

7. CONCLUSIONS: Clothianidin was provided in fortified pollen patties (spiked with treated sucrose) *ad libitum* at mean measured rates of < 1.0 µg/kg (negative control), 100 µg/kg, 400 µg/kg, and 1600 µg/kg (mean concentrations 86 µg/kg, 372 µg/kg and 1460 µg/kg) in a field setting to free-foraging honey bees (*Apis mellifera*) in a colony feeding study in rural North Carolina, USA. The evaluation of the treatment effects focused on colony condition assessments (CCAs) to determine condition of the colonies and residue analysis to verify exposure to the treated pollen patties.

Post-feeding pollen patty samples showed no appreciable change in clothianidin concentrations with samples averaging 101, 108 and 102% of initial measured concentrations.

The study comprised four treatment groups: 1 untreated control group (UTC) and 3 test item treatment groups with 8 replications of the untreated control group and 8 replications of each test item treatment group for a total of 32 colonies. Colonies were divided into 4 groups and placed at 4 different locations (apiaries). Pollen patty amounts of 200 g for each feeding were placed inside hives in the middle of the brood nest between two combs containing brood and renewed three times a week over a six-week exposure period (total amount 3600 g per hive). Actual consumption of pollen patties in the control hives averaged 1500 g over the entire six-week treatment period. Colony development and strength (presence of various life stages and frame area covered with adult bees, brood, food stores) were assessed (referred to as colony condition assessments or CCAs) at six-time points during the study: before exposure (2), during exposure (1), and after exposure (3). Samples of uncapped nectar and bee bread were collected from the treatment and control hives to evaluate potential movement of the test material into hive food stores during the study.

Analyses of the CCA data indicate apparent effects on apical colony endpoints at the 1460 µg/kg treatment level. The largest treatment related effects on apical endpoints observed was a significant decrease in the mean number of adults, but also included decreases in pupae. These effects were observed consistently at multiple time points during and after the treatment period, and exhibit dose-response relationships. Additional consistent effects at multiple time points for this treatment level were also observed on food matrices including decreased pollen storage and uncapped nectar. Treatment level effects on uncapped nectar storage were observed at both the 372 and 1460 µg/kg treatment groups. However, effects on honey-alone storage were not observed and effects on combined nectar and honey production as well as pollen storage were only observed in the 1460 µg/kg treatment group.

In the context of available field studies involving honey bees, this study has the following strengths:

- Inclusion of multiple colony-level endpoints reflecting hive strength, brood development and food stores.
- Availability of raw data for conducting statistical analysis.
- Quantification of exposure to clothianidin in hive matrices (uncapped nectar, capped honey, and bee bread).
- Clothianidin was quantified in the feeding patties.
- Detailed QA/QC results regarding quantification of clothianidin residues in various matrices.

Limitations in this study include:

1) High colony failure (50%) in lowest test level (86 µg/kg) at CCA 6. This did not follow a dose-response (only 1 hive failed at next dose) and is not considered a treatment-related effect.
2) Limited N (4 apiaries; 8 hives per treatment); this is considered understandable, since the study is a pilot.
3) Only 3 test concentrations were tested; again, this is considered understandable because this is a pilot study.
4) Bees were fed natural pollen. A background pesticide analysis was not conducted to determine whether bees were exposed to other chemical stressors.
5) CCA6 exhibited a high degree of colony failure at the highest and lowest treatment levels. Additionally, as is common for honey bee colonies at this time of year (mid-October, when colonies are beginning to prepare for the overwintering period), there was a decrease in the production of new bees in both controls and treatment groups. This normal decrease, coupled with the high colony failures observed in the low and high treatment groups, prohibited conducting statistical comparisons with any degree of certainty at CCA6.
6) High variability in all endpoints, as is common in field tests with honey bees, limits the ability to detect relatively small differences across treatments.
7) The study did not evaluate overwintering success. Again, this is viewed as an understandable omission due to this being a pilot test.

The reviewer also notes that the study supplied supplemental sucrose solution around CCA3 to control and treatment hives. Ideally, in a spiked CFS, no supplemental feeding resources (in this case, sucrose) are provided during the exposure period in order to force bees to go out and forage for the resource. However, it is understood that the decision to provide supplemental sucrose solution was based on the condition of honey/nectar stores of control hives and reflect the dearth of floral resources at this time, reflecting the best beekeeping practices of the study region.

Strongly significant ($p<0.05$) and consistent effects were observed in the 1460 µg/kg treatment group with effects observed in all assessment endpoints and overall colony survival. Slightly significant ($p<0.10$) differences in egg counts were observed at one CCA in the 372 µg/kg treatment group, but this was not considered a consistent adverse effect. Treatment-related effects on uncapped nectar production and pollen patty consumption were observed at the 372 µg/kg and 1460 µg/kg treatment groups, however these are not considered apical endpoints. Additionally, total honey and nectar production at the 372 µg/kg treatment group were not significantly different from controls. Further, the concurrently conducted sucrose colony feeding study (MRID 50312501) found that effects observed on food storage (pollen storage at the biological NOAEC of 19 µg/kg) did not impact overall colony survival, even following overwintering (see DER for MRID 50312501 for more details). Therefore the biological NOAEC and LOAEC for this study, based on consistent effects to apical endpoints is concluded to be 372 and 1460 µg/kg, respectively. The food storage and food consumption NOAEC and LOAEC, based on the non-apical endpoints of nectar stores and pollen patty consumption, is considered 86 and 372 µg/kg, respectively.

8. ADEQUACY OF THE STUDY: This study is scientifically sound and is classified as **supplemental** for quantitative use in risk assessment.

9. GUIDELINE DEVIATIONS: This semi-field study was conducted following the US EPA OCSPP 850.SUPP (special design study). A protocol was not submitted to the Agency ahead of study initiation. The study report notes that no major deviations from their study plan (dated June 30, 2017) and amendment (dated Oct 10, 2017) were identified.

10. SUBMISSION PURPOSE: This study was designed to determine long-term effects on honey bee (*Apis mellifera* L., *A. mellifera ligustica*) colonies during and after dietary intake of clothianidin fortified pollen patty (spiked with treated sucrose solution) under field conditions in North Carolina, USA. The evaluation of the treatment effects focused on colony condition assessments (CCAs) to determine condition of the colonies and residue analysis to verify exposure to the treated pollen patties.

11. MATERIALS AND METHODS

Test Material:

Identity:	Clothianidin
IUPAC name (ai):	(E)-1-(2-chloro-1,3-thiazol-5-ylmethyl)-3-methyl-2-nitroguanidine
CAS name (ai):	[C(E)]-N-[(2-chloro-5-thiazolyl)methyl]-N′-methyl-N″-nitroguanidine
CAS No.:	210880-92-5

Batch No.:	AE1283742-01-10
Description:	White solid
Purity:	98.6% ai
Storage:	+10 to +30°C

Test Organisms/Hives: The test organism is the honey bee, *Apis mellifera* L. (Hymenoptera, Apidae); locally bred stock of *A. mellifera ligustica*. The test colonies were obtained from Eurofins-owned mother hives, typical of the bee stock used in commercial beekeeping operations. Established colonies were transferred onto new hive material over the course of several weeks prior to start of the study. New boxes, frames and foundations were used. The colonies were maintained in 2-3 Langstroth boxes (10-frame). Each hive contained two modified frames for providing pollen substitute and a drone frame. Drone frames were plastic frames with cells in the foundation that are larger than that of regular foundation to accommodate for drone brood. Division board feeders taking up the space of 2 frames was present in some hives, although no supplemental feeding was provided using these feeders after initiation of the treatments. A pollen trap was placed under each hive after placement in study apiaries. Pollen traps were activated during the 6 week treatment period to minimize foraged pollen from entered the hive and maximizing the use of the pollen patties.

The first Colony Condition Assessments (CCA1) were initiated on 21 – 22 Jun 2017. Around 50 - 60 colonies were analyzed to select the hives that met the criteria for use in the study. Hives were checked for general health with no visible disease symptoms of *Varroa* or *Nosema*, as well as having all stages of brood, a queen, and some food stores.

The 32 hives needed in the study were selected based on the data of the second CCA. Hives were ordered into 4 apiary groups based on brood strength of the colony, starting with Apiary A with the strongest hives, and ending with Apiary D with the smallest hives (4 x 8 = 32 hives).

Hives were moved from the holding yard to the study apiary site locations on 01 Jul 2017 starting at 08:30 pm until 10:00 pm. CCA's continued for the study on 05 – 07 Jul 2017 (CCA2), 01 – 03 Aug 2017 (CCA3), 24 + 25 Aug 2017 (CCA4), 19 + 20 Sep (CCA5) and on 16 + 18 Oct 2017 (CCA6).

Treatments against *Varroa* were conducted twice before the start of the study to minimize potential damage through *Varroa* infestation and to avoid any treatment during the exposure phase. All hives received two doses of Apiguard (active ingredient, thymol), per manufacturer's instructions and recommendations. The first treatment was performed on 12 Jun 2017 and the second was placed on 17 Jun 2017. During the course of the study another V*arroa* treatment was performed with Formic Pro (active ingredient, formic acid) on 22 Sep 2017 as a common practice based on the time of a year. All hives were treated equally.

Apiary sites: The field and sampling phases of this study were conducted by Eurofins Agroscience Services Inc., Cedar Grove Research Facility, NC, USA. Apiary locations were separated by at least 1 mile (1.6 kilometers) and equally separated from other known honey bee apiaries within the study region. The four apiary sites were located in the vicinity of Mebane, NC (see Figure 1 and Figure 2). The study area is a patchwork of forested and open land. There are some small tracts of crops such as tobacco, corn, and soybeans, but most of the land is non-intensively managed pasture and forest. Consequently, the potential for exposure of bees to pesticides outside of this test is relatively low.

Hives were blocked into 4 groups, based on brood strength, one group of 8 hives for each apiary (A – D). The hives were ranked and organized with Apiary A as the group of strongest hives to Apiary D as the group of smallest hives. Assignment of apiaries to the geographic locations was done randomly. Each hive within an apiary was spatially separated from other treatment rate hives by at least 9.14 m.

Application rates/volumes: The nominal Clothianidin application rates were 0 (negative control), 100 µg/kg, 400 µg/kg, and 1600 µg/kg (mean concentrations < 1.0 µg/kg (negative control), 86 µg/kg, 372 µg/kg and 1460 µg/kg) No reference item was tested.

Feeding (Application): Dosing of the honey bees with the test item for the treatment groups consisted of preparation of clothianidin-spiked pollen patty at 3 different concentrations with 1 concentration for each treatment group, replicated by 2 colonies at 4 apiaries.

The clothianidin pollen patty was provided to the treated hives three times a week for six weeks, starting on 12 Jul 2017 and ending with last retrieval of remaining pollen patty on 21 Aug 2017. At each renewal, 200 g patty was provided to each colony and any patty remaining from the previous feeding was removed and weighed.

A hand-tailored pollen feeding frame feeder was used to administer the patties during the exposure period. Modified frames were constructed by removal of the middle third of the foundation and creating a space for plastic petri dishes holding the pollen patty. Plastic queen excluder was cut to fit into the feeder section of the modified frames to hold the dishes in place and allow access of hive bees to the pollen patties (see Figure 3). Feeding patties were not accessible outside of the hive and were not exposed to sunlight except minimally during patty exchange. For the preparation of the feeding, 50:50 sugar solution was prepared by mixing household sugar and tap water 1:1 (w/w). The test item was added to the sugar solution first and then the test item spiked sugar solution was mixed with dry pollen powder / AP23® to a stiff paste (70 %powder, 30 % solution (w/w)). Homogeneity of the feeding patty was obtained by thorough stirring or mixing. For the first six feeding events A1 – A6 ground pollen and AP23® were used in a ratio of 50:50, afterwards the ratio was switched to 70 pollen: 30 AP23® in the intention to encourage food uptake.

The natural pollen used in the feeding was obtained from pollen traps attached in hives located in the central Piedmont area of NC near the study area. Pollen was collected during the Spring of 2017. Pollen baskets were stored frozen until use. Before use in the preparation of pollen patties, the pollen baskets were first ground frozen into a powder. The patty was prepared using the test item CoA purity for calculating test item, sugar solution and pollen powder amounts. Mixing of test item and other ingredients was on w/w basis.

Honeybee Healthy® (HBH) was added to the feeding patty at a concentration of 6 % for the feeding events A5 and A6, and was later on added at the recommended dose of 1 % from A7 onwards. For A1 to A4 no HBH was used. HBH is a feeding stimulant that contains spearmint and lemongrass oil.

For feeding the control colonies and for maintenance of the colonies pure untreated pollen patty was used.

Stock solutions were prepared on 10 Jul 2017, 17 Jul 2017, 24 Jul 2017, 31 Jul 2017, 07 Aug 2017 and 14 Aug 2017, and stored in the dark in a refrigerator.

Observations: Meteorological data during the exposure phase the following environmental data were recorded:

- Temperature (daily minimum/maximum)

- Relative air humidity (daily minimum/maximum)

- Rainfall

Temperature, humidity, and rainfall data were obtained from on-site weather station WS-NC1 at Cedar Grove within distances to the apiaries ranging from 4.3 (Apiary D) to 9.2 km (Apiary B).

Colony Assessments
The following parameters were physically observed during the colony assessments:

- Colony strength (number of bees, estimation adapted to IMDORF & GERIG, 1999, and IMDORF *et al*., 1987)
- Likely presence of a queen (e.g. presence of eggs)
- Pollen storage area and area with nectar or honey (estimation adapted to IMDORF & GERIG, 1999, and IMDORF *et al*., 1987)
- Area containing cells with eggs, larvae and capped cells (estimation adapted to IMDORF & GERIG, 1999, and IMDORF *et al*., 1987)

At each CCA the comb area covered with bees or containing cells with nectar, pollen, eggs, larvae, and capped cells was estimated per comb side (in %). The total number of bees and the total area containing the single brood stages, pollen and nectar on the comb was calculated for each hive. Mean values were calculated for each treatment and assessment date.

Any colony that did not show the presence of a queen and had no open brood or eggs, or was devoid of worker (female) bees was considered “dead”. If a hive was considered “dead” at the time of assessment, it was no longer used in the analysis of endpoints (e.g., adult bee numbers, hive weight).

During a CCA the proportion of the area of each side of each frame in the colony covered or filled with hive components (e.g., bees, eggs, larvae, food stores) was recorded. These values were converted to a total number of cells by multiplying the proportions recorded by 3440, which is the total number of cells for one side of a frame. To estimate the adult bee population, the values were converted to a total number of dm^2 ($100\ cm^2$) and the area covered in dm^2 was multiplied by 130, since previous studies found in literature had determined that approximately 130 bees would fill a 1 dm^2 area.

For drone frames, the cell foundation size is larger than the cells in normal foundation. For this frame, the number of cells on a frame side are 2135. For the endpoints of honey, nectar, and bee bread (pollen stores), cell counts were calculated using normal foundation numbers (i.e., 3440 cells per frame side). The actual area that these food resources occupy on the drone frames is the same as normal frames and is the relevant metric for these endpoints. Here the number of cells reported reflect the area of the frames used for food storage. The cells calculated from the drone frames can therefore be considered to be in terms of normal cell equivalents. For brood-related endpoints, it is the number of individuals that is the relevant metric. For these endpoints, the 2135 cells per frame side is used so that the number of brood cells is directly equal to the number of individual bees at the reported developmental stage.

At each CCA, each comb of the colonies were assessed visually for symptoms of bee diseases according to standard beekeeping practice. Accordingly, any unusual occurrences and clear symptoms of disease (*e.g.* chalk brood, sacbrood, Nosema, American or European foulbrood) or pests (*e.g. Varroa* sp., small hive beetle *Aethina tumida*) were recorded.

All the colonies within a given apiary were assessed by the same observer so that any observer-to-observer variability was accounted for in the blocking factor of the statistical analyses.

During CCAs, each hive was checked for abnormal behaviors of a significant numbers of bees. These behaviors included, but were not limited to, excessive crawling (numerous bees walking slowly, apparently unable/unwilling to fly) and disorientation (flying or walking erratically as if unable to determine direction).

Sampling: Control samples were always collected before the treated samples or by different personnel. Separate equipment was used for sampling each hive.

Pollen traps were activated at the entrances of all hives. These pollen traps remained activated (pollen grids closed) for about 6 six weeks during the entire feeding period to minimize incoming pollen. At each feeding event or food exchange, all pollen which was collected between two food exchanges were sampled and weighed.

Bee bread (= pollen) samples were taken once after the exposure phase with pollen corers for potential residue analysis of the test item. A pooled sample was collected from at least 5 different locations per colony. If possible, 5 separate frames and both comb sides were chosen for sampling.

Honey (nectar) samples were taken once after exposure with a single use plastic spoon for potential residue analysis of the test item. A pooled sample was collected from at least 5 different locations per colony. If possible, 5 separate frames and both comb sides were chosen for sampling.

Control samples were collected before the treated samples or by different personnel. Separate equipment was used for sampling of each hive.

Residue Analysis Method: Samples for dose verification and determination of stability of the test item in the feeding patties were analyzed according to Bayer CropScience Method No. TI-006-A13-02 (Gould, T.J., 2015: An Analytical Method for the Determination of Residues of Clothianidin in Bee Relevant Matrices Using LC/MS/MS, Bayer CropScience Method No. TI-006-A13-02).

The residue method for clothianidin in bee relevant matrices with modifications used in the analysis of clothianidin in samples is included in the study report as Appendix A6. All analyses were conducted by the Residue Chemistry group at Bayer CropScience in

Research Triangle Park, NC. Sample matrices analyzed were of the clothianidin test material in bee bread substitute, uncapped nectar collected from in hives and pollen stores (i.e., bee bread) collected from in hives. The bee bread substitute was a mix of pollen powder and spiked sucrose solution and was collected before and after administration to test hives.

For bee bread substitute and in-hive bee bread samples, approximately 0.5 g of sample was weighed into a 30-mL Omnibead tube and dissolved in 4.0 mL of HPLC-grade water and 16 mL of acetonitrile. The tube was capped and shaken for 1 min using an OmniRuptor. Approximately 4 g magnesium sulfate ($MgSO_4$) and 1 g sodium chloride (NaCl) was added to the sample which was amended with labeled internal standard. The tube was capped and shaken at 5 m/s for 1 min using an OmniRuptor. Samples were then centrifuged at 4000 rpm for 5 minutes.

The supernatant (approximately 10 mL) was decanted into a 15-mL tube containing approximately 0.15 g PSA and 0.9 g $MgSO_4$ and vortexed for approximately 1 min. Samples were then centrifuged at 2500 rpm for 5 min. A 2.5 mL aliquot of the sample was added to a preconditioned Bond Elute SPE cartridge (50 mg, 3 mL cartridge prewashed with one cartridge volume of methanol (MeOH) then one cartridge volume of water). The eluate was collected into a glass tube and concentrated in a TurboVap at 50°C to near dryness. Samples were reconstituted in 0.5 mL of 4:1 water:MeOH and sonicated or vortexed as needed. Sample solutions were transferred to an HPLC vial for analysis by LC/MS/MS.

For uncapped nectar, 150 µL of sample (approximately 0.2 g) was pipetted into a pre-weighed culture tube. Samples weights were recorded. Samples were dissolved in 3 mL of HPLC grade water and amended with 0.02 mL of the labeled internal standard. Samples were mixed well. Sample solutions were then loaded on a 3 mL C-18 SPE cartridge (50 mg, prewashed with 1 mL MeOH then 1 mL water). Cartridges were washed with 1 mL of 1:10 MeOH:water (v/v) and then eluted with 1 mL of 4:1 MeOH/water (v/v). Eluate was then evaporated to near dryness in a TurboVap at 50°C and then reconstituted in 0.5 mL of 1:9 MeOH/water (v/v). Samples were sonicated as needed and then transferred to an HPLC vial for analysis by LC/MS/MS.

Summary of Study Dates:

The table that follows (reprinted from the study report, p. 36-38) documents the dates of field phase activities.

Table 1. Chronological list of study activities (reprinted from Table 7, p. 36-38 of study report)

Activity code[a]	Study week	Timing[b]	Description	Responsible person
EA	-13 week of 10 Apr 2017	13(±2)WB	Installation of nucleus bee colonies on new material	Field PI
EV	-6 week of 30/31 May 2017	6(±2)WBE	Beekeeper check (before study initiation)	Field PI
CCA1 21 - 23 Jun 2017	-3 week of 19 Jun 2017	4(±1)WBE	1st colony condition assessment (CCA1; before study initiation); Assignment of colony locations	Field PI
EA	-2 week of 26 Jun 2017	2(±1)WBE	Move colonies to the test locations / apiaries	Field PI
CCA2, S1 05 - 07 Jul 2017	-1(±1) week of 03 Jul 2017	1(±1)WBE	2nd colony condition assessment (CCA2); Sampling of adult bees for *Varroa* and *Nosema* testing; Start of manual hive weight recording	Field PI
A1 + A2 + A3, 10 + 12 + 14 Jul 2017 S2 12 + 14 Jul 2017	0 week of 10 Jul 2017	0WAE	Start of exposure / feeding = 1st application via feeding spiked pollen patty (three feedings per week = A1, A2 and A3) Sampling of pollen patty used for spiking from each test item dose and control before feeding; Sampling of feeding patty from each test item dose and control before feeding (pre-feeding samples); Sampling of stability samples stored in colonies (post-feeding samples);	Field PI
S3 12 Jul 2017	0 week of 10 Jul 2017	0WAE	Sampling of pollen from pollen trap during patty exchange for A2	Field PI
S4 14 Jul 2017	0 week of 10 Jul 2017	0WAE	Sampling of pollen from pollen trap during patty exchange for A3	Field PI
A4 + A5 + A6 17 + 19 + 21 Jul 2017	+1 week of 17 Jul 2017	1WAE	Three feedings (A4, A5 and A6)	Field PI
S5 19 Jul 2017	+1 week of 17 Jul 2017	1WAE	Sampling of pollen from pollen trap during patty exchange for A4	Field PI
S6 21 Jul 2017	+1 week of 17 Jul 2017	1WAE	Sampling of pollen from pollen trap during patty exchange for A5	Field PI

S = sampling, A = application (feeding), WBE/WAE = weeks before/after start of exposure

Activity code[a]	Study week	Timing[b]	Description	Responsible person
S7 24 Jul 2017	+2 week of 24 Jul 2017	1WAE	Sampling of pollen from pollen trap during patty exchange for A6	Field PI
A7 + A8 + A9, 26 + 28 + 31 Jul 2017 S8 26 + 28 Jul 2017	+2 week of 24 Jul 2017	2WAE	Three feedings (A7, A8 and A9); Sampling of pollen patty used for spiking from each test item dose and control before feeding; Sampling of feeding patty from each test item dose and control before feeding (pre-feeding samples); Sampling of stability samples stored in colonies (post-feeding samples);	Field PI
S9 26 Jul 2017	+2 week of 24 Jul 2017	2WAE	Sampling of pollen from pollen trap during patty exchange for A7	Field PI
S10 28 Jul 2017	+2 week of 24 Jul 2017	2WAE	Sampling of pollen from pollen trap during patty exchange for A8	Field PI
S11 31 Jul 2017	+3 week of 31 Jul 2017	2WAE	Sampling of pollen from pollen trap during patty exchange for A9	Field PI
CCA3 01 – 03 Aug 2017	+3(±1) week of 31 Jul 2017	3(±1)WAE	3rd colony condition assessment (CCA3)	Field PI
A10 + A11 + A12 02 + 04 + 06 Aug 2017	+3 week of 31 Jul 2017	3WAE	Three feedings (A10, A11 and A12)	Field PI
S12 02 Aug 2017	+3 week of 31 Jul 2017	3WAE	Sampling of pollen from pollen trap during patty exchange for A10	Field PI
S13 04 Aug 2017	+3 week of 31 Jul 2017	3WAE	Sampling of pollen from pollen trap during patty exchange for A11	Field PI
S14 07 Aug 2017	+4 week of 07 Aug 2017	3WAE	Sampling of pollen from pollen trap during patty exchange for A12	Field PI
A13 + A14 + A15 07 + 09 + 11 Aug 2017	+4 week of 07 Aug 2017	4WAE	Three feedings (A13, A14 and A15)	Field PI
S15 09 Aug 2017	+4 week of 07 Aug 2017	4WAE	Sampling of pollen from pollen trap during patty exchange for A13	Field PI
S16 11 Aug 2017	+4 week of 07 Aug 2017	4WAE	Sampling of pollen from pollen trap during patty exchange for A14	Field PI

S = sampling, A = application (feeding), WBE/WAE = weeks before/after start of exposure

Activity code[a]	Study week	Timing[b]	Description	Responsible person
S17 14 Aug 2017	+5 week of 14 Aug 2017	4WAE	Sampling of pollen from pollen trap during patty exchange for A15	Field PI
A16 + A17 + A18 12 + 16 + 18 Aug 2017 S18 16 + 18 Aug 2017	+4/+5 weeks of 07 and 14 Aug 2017	5WAE	Three feedings (A16, A17 and A18); Sampling of pollen patty used for spiking from each test item dose and control before feeding; Sampling of feeding patty from each test item dose and control before feeding (pre-feeding samples); Sampling of stability samples stored in colonies (post-feeding samples);	Field PI
S19 16 Aug 2017	+5 week of 14 Aug 2017	5WAE	Sampling of pollen from pollen trap during patty exchange for A16	Field PI
S20 18 Aug 2017	+5 week of 14 Aug 2017	5WAE	Sampling of pollen from pollen trap during patty exchange for A17	Field PI
S21 21 Aug 2017	+6 week of 21 Aug 2017	5WAE	Sampling of pollen from pollen trap during patty exchange for A18	Field PI
S22 21 + 22 Aug 2017	+6(±1) week of 21 Aug 2017	6(±1)WAE	Sampling of nectar and pollen from combs after end of exposure (before opening of the pollen traps)	Field PI
CCA4 24 + 25 Aug 2017, S23 21 + 23 Aug 2017	+6(±1) week of 21 Aug 2017	6(±1)WAE	4th colony condition assessment (CCA4); Sampling of adult bees for *Varroa* and *Nosema* testing	Field PI
CCA5 19 + 20 Sep 2017	+10(±1) week of 18 Sep 2017	10(±1) WAE	5th colony condition assessment (CCA5)	Field PI
CCA6, S24 16 + 18 Oct 2017	+14(±1) week of 16 Oct 2017	14(±1) WAE	6th colony condition assessment (CCA6); Sampling of adult bees for *Varroa* and *Nosema* testing	Field PI

S = sampling, A = application (feeding), WBE/WAE = weeks before/after start of exposure

<u>Study Author Statistical Analysis</u>: The influence of the test material was evaluated by comparing the results in the five treatment groups to the control. The statistical software program SAS version 9.3 was used for the statistical analysis of the data. For the pre-application data, all tests were done in a two-tailed approach whereas for the data assessed after treatment initiation, one tailed tests were conducted. For all tests, $\alpha = 0.05$.

Data were analyzed for normality using Shapiro-Wilk's test. If the data fit the normal distribution ($p \geq 0.2$), then Bartlett's test was used to test for homogeneity of variance. If the data did not fit the normal distribution, Levene's test was used to test for homoscedasticity. Data were log-transformed or Box-Cox transformed to address issues with non-normality and heteroscedasticity, and if the transformations were effective then the transformed data were used for subsequent analyses.

Depending on the nature of the data, subsequent analyses were conducted using Dunnett's t-test, the Bonferroni-Holms corrected Satterthwaite t-test, or the Bonferroni-Holms corrected U-test. Colony death data were analyzed using Fisher's Exact Test (Bonferroni-Holms corrected, one-sided, $p \geq 0.05$).

Reviewer Statistical Methods

Variables recorded at each CCA and subjected to data analysis were:

- Number of adults
- Number of egg cells
- Number of open (larvae) cells
- Number of capped (pupae) cells
- Number of pollen cells
- Number of honey cells
- Number of uncapped nectar cells
- Number of total honey+nectar cells

The experimental design was a randomized complete block (apiary) with repeated measures (CCA) and data will be analyzed in SAS (v9.4) using the PROC MIXED procedure. Compound symmetry with heterogeneous variance (CSH; fits a unique variance at each time point and a single correlation coefficient for all pairwise correlations regardless of distance between time points) was used for the repeated measures correlation structure. At each time point (CCA), a one-sided Dunnett’s test (testing for a reduction in the response relative to the control) was used to compare each treatment to the control. At each treatment level, a two-sided Dunnett’s test was sued to compare the response at each CCA to the initial response at CCA2.

Since hives were not assigned and placed in the study apiaries until shortly before CCA2, the data for the statistical analysis only included data collected from CCA2 until the study conclusion at CCA6. As the hive mortality was very large for the highest treatment level (1460 µg/kg) at CCA6, these data were not included in the mixed model analysis. Although this resulted in an unbalanced design, least-square means (i.e.; LS means) and Dunnett contrasts for the all remaining treatment-CCA combinations were estimable. To facilitate computation and algorithm convergence in SAS, all measured response variables were divided by 1000 prior to any statistical analysis. The SAS snippet below provides an example of the code used for statistical analysis:

```
proc mixed;
class apiary cca conc hive;
model adult_scale = conc|cca /DDFM=SATTERTHWAITE;
random apiary ;
repeated cca/ subject=hive*conc(apiary) type=csh;
lsmeans conc*cca/cl;
slice conc*cca /sliceby=cca diff=controll adjust=dunnett;
slice conc*cca /sliceby=conc diff=control adjust=dunnett;
run;
```

Statistical results presented in this DER represent the reviewer-verified results, except where noted as study author reported results. The statistical output for the reviewer-verified results can be found in **Appendix 1.**

12. RESULTS

Mortality of the Colonies: From the 4 sites with a combined 32 hives, 12 hives (37.5 %) were considered dead at the end of the study (by CCA6).Although colony mortality was 50% in the 82 µg/kg treatment group, the reviewer determined that this was not treatment-related, as mortality was similar to the controls (12.5%) in the 372 µg/kg treatment group. The 75% mortality observed in the 1460 µg/kg treatment group was considered treatment related. Most of the hive deaths occurred between CCAs 5 and 6, including 3 of the 4 dead hives at the 82 µg/kg treatment group and all 6 of the hives at the 1460 µg/kg treatment group (**Table 2**). Overall, the data for CCAs 3 through 5 are therefore considered the most useful for making treatment comparisons.

Table 1: Dead colonies during the study.

Treatment (µg/kg)	UTC	T1 (82)	T2 (372)	T3 (1460)
Dead colonies/total colonies [n]	1/8	4/8	1/8	6/8
Mortality [%]	12.5	50	12.5	75
Surviving colonies [%]	87.5	50	87.5	25

Table 2: Colony Survival by CCA

Assessment	**UTC**	**82 µg/kg**	**372 µg/kg**	**1460 µg/kg**
CCA1	100%	100%	100%	100%
CCA2	100%	100%	100%	100%

CCA3	100%	88%	100%	100%
CCA4	100%	88%	100%	100%
CCA5	88%	88%	100%	100%
CCA6	88%	50%	88%	25%

Strength of the colonies: Figure 1 demonstrates the colony strength (determined as the mean estimated number of adult honey bees per colony) in the test item treatment groups T1 – T3 (86 -1460 µg/kg) and in the control UTC during the assessment period from 21 Jun 2017 (CCA1) to 18 Oct 2017 (CCA6). Error bars denote the standard deviation of the control colonies for each assessment.

The hives were grouped based on hive strength, i.e., the number of adult bees which were assessed during CCA1 and assigned to the different apiaries (A-D; A accommodating the strongest and D the smallest hives). Due to this stratified randomization, differences in mean colony strength between treatments and the control is very small at CCA1.

The overall colony strength was relatively stable in the controls during most of the study with an apparent peak during CCA3. Colony strength was reduced in the last CCA (CCA6) as the colonies were preparing for the overwintering period.

The mean colony strength was comparable to the controls for the 86 and 372 µg/kg treatment groups throughout the course of the study. In the 1460 µg/kg treatment group a sizeable reduction in colony strength had already occurred 3 weeks into the treatment (CCA3). This reduction continued into CCA4 which marked the end of the treatment period. Numbers of adult bees in the 1460 µg/kg group were significantly lower ($p<0.05$) than the controls at CCA3, CCA4, and CCA5. By CCA6, only two colonies were alive in the 1460 µg/kg treatment. The two remaining colonies were weak and were noted as having problematic levels of hive pests present at the end of the study. As colony mortality was significantly increased at this point, this treatment group was excluded from statistical analyses at this assessment.

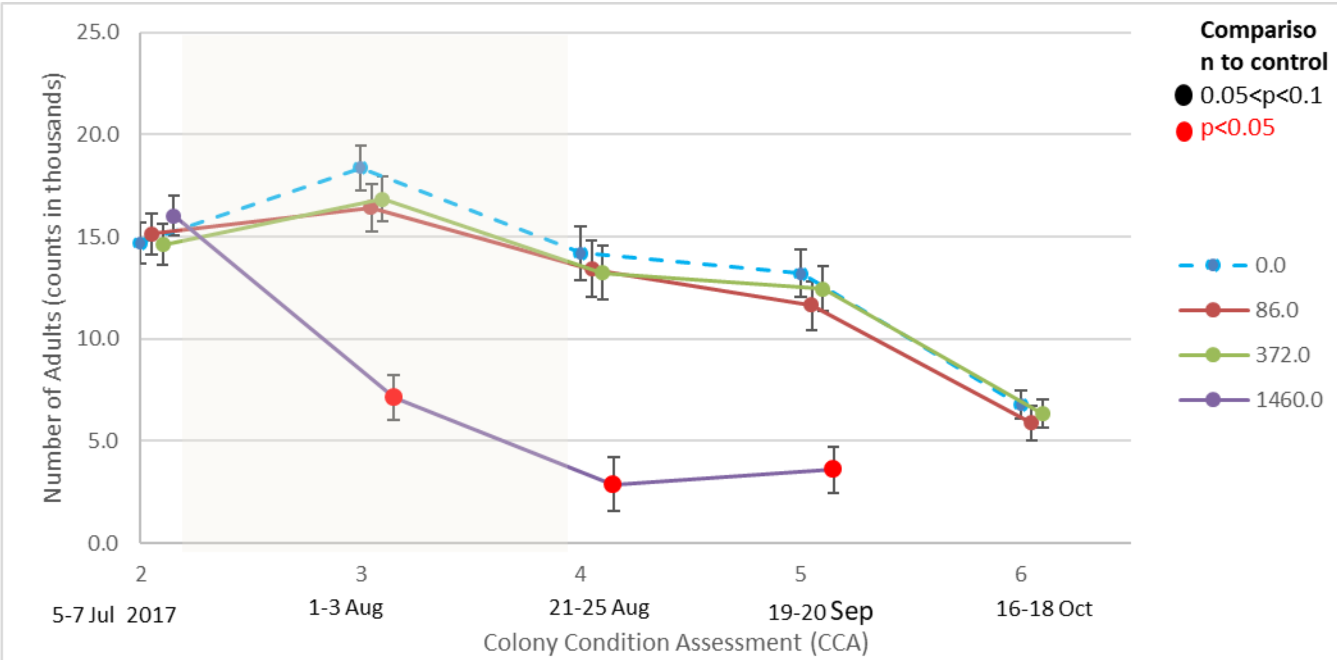


Figure 1. Mean colony strength (mean number of bees per colony) by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

Brood stages: For brood development in the control and all treatment groups, all brood stages (eggs, larvae, pupae) were observed at each assessment throughout the study (**Figures 2-4**).The study author reported that no significant differences were detected for total brood cells in the86 and 372 µg/kg treatment levels compared to the controls, but that total brood numbers in the 1460 µg/kg group were significantly lower than controls at CCAs 4 and 5. The reviewer did not statistically analyze brood nest as an endpoint, but did review each individual brood compartment.

Mean colony egg counts were similar between controls and the 86 µg/kg treatment groups throughout the study, while at CCA5, egg counts in the 372 µg/kg ($p<0.1$) and 1460 µg/kg ($p<0.05$) were reduced by 37% and 62%, respectively (**Figure 2**). By CCA6, mean egg counts in the 372 µg/kg group were 26% lower than controls, but were not significantly different ($p=0.28$). At noted above, by CCA6, only two colonies were alive in the 1460 µg/kg treatment. As colony mortality was significantly increased at this point, this treatment group was excluded from statistical analyses at this assessment.

Mean counts of open brood (larvae) cells were significantly lower ($p<0.05$) in the 1460 µg/kg treatment group than controls colonies at CCA5 (48% reduction). Although not statistically significant ($p=0.15$), mean larval cell counts in the 1460 µg/kg treatment group were 47% lower than controls at CCA4 as well (**Figure 3**). Larval cell counts were not reduced compared to the controls in either the 86 or 372 µg/kg treatment group at any time point.

The capped brood (pupae) endpoint showed similar trends to the larval endpoint. Significant reductions were only observed in the 1460 µg/kg treatment group, and occurred at both CCAs 4 and 5 ($p<0.05$), with mean reductions greater than 70%, relative to controls, at both CCAs (**Figure 4**), while pupal cell counts were not reduced compared to the controls in either the 86 or 372 µg/kg treatment groups at any time point.

Overall for brood endpoints, no differences from control were detected in any assessment for any endpoint in the 86 µg/kg treatment group and the only significantly lower difference detected in the 372 µg/kg treatment group was for lower egg counts at CCA5. While there is evidence of a concentration-response relationship for the 372 µg/kg dose, this observation only occurs at one time point and is the only brood-related endpoint in which this occurs. If eggs were truly affected in the colonies of this treatment, then larval and then pupal counts would also be expected to reflect this reduction. This is not observed in the larval or pupal cells at this assessment nor for egg cell counts at CCA4 or CCA6. Every other assessment endpoint (adult bees, total brood, larvae, pupae, pollen stores, honey/nectar stores) had significantly lower levels observed by CCA4, but only in the 1460 µg/kg treatment. It is unlikely that eggs are a more sensitive endpoint than these other endpoints and exhibit effects later than the other measured endpoints. Given the lack of consistent effects across multiple CCAs and comparison with the other colony endpoints, the study author concluded that this observation is not considered an adverse effect in the interpretation of the study results for the 372 µg/kg treatment level. The reviewer agrees with this interpretation, but notes the uncertainty resulting from both the significant difference in egg counts at CCA 5 and the non-significant, but still somewhat considerable decrease in egg counts at CCA 6 (26%) in this treatment group.

For the 1460 µg/kg treatment, significantly lower counts are observed in pupal counts for CCA4. By CCA5 counts for all development stages (eggs, larvae, pupae) are significantly lower in the 1460 µg/kg treatment than the control.

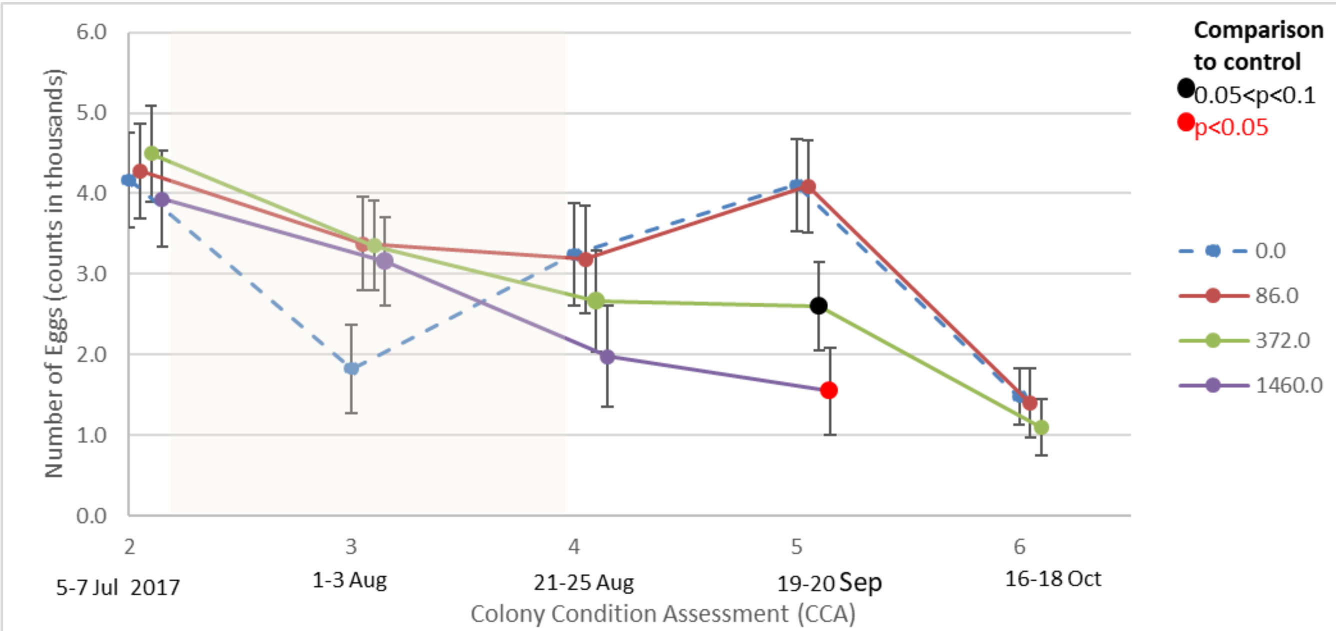


Figure 2. Number of eggs. by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

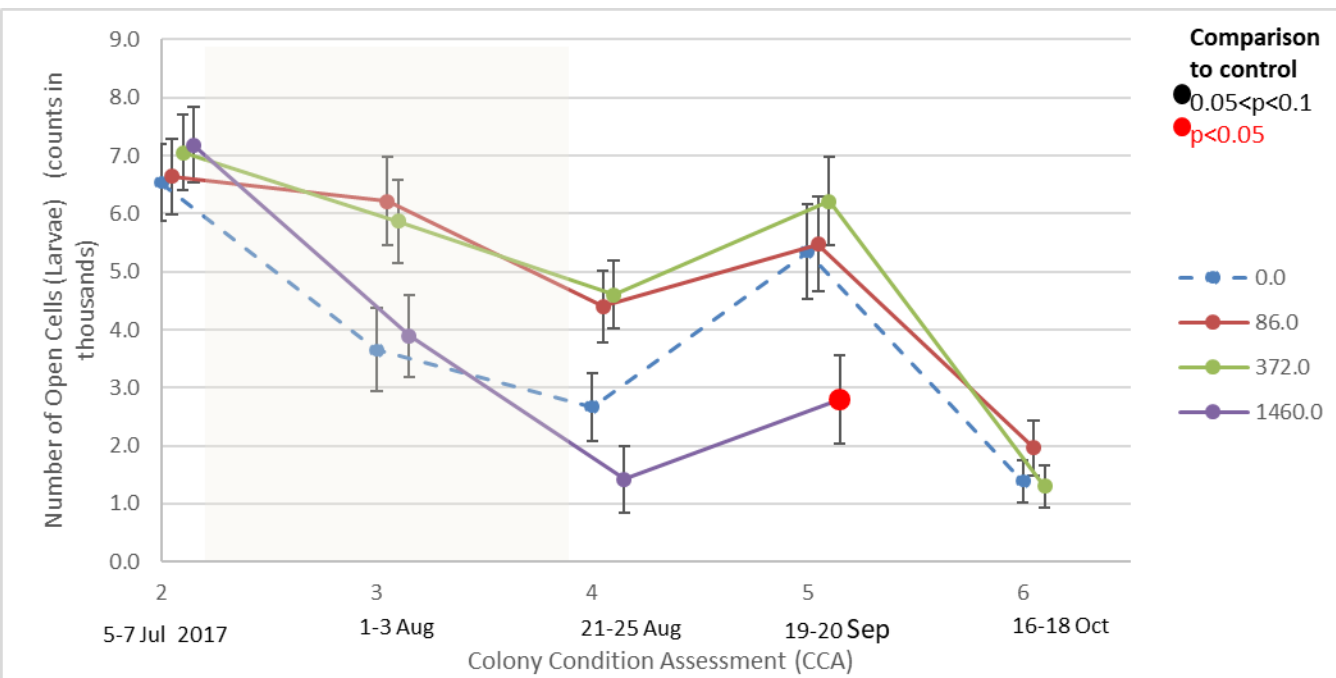


Figure 3. Number of open cells (larvae) by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

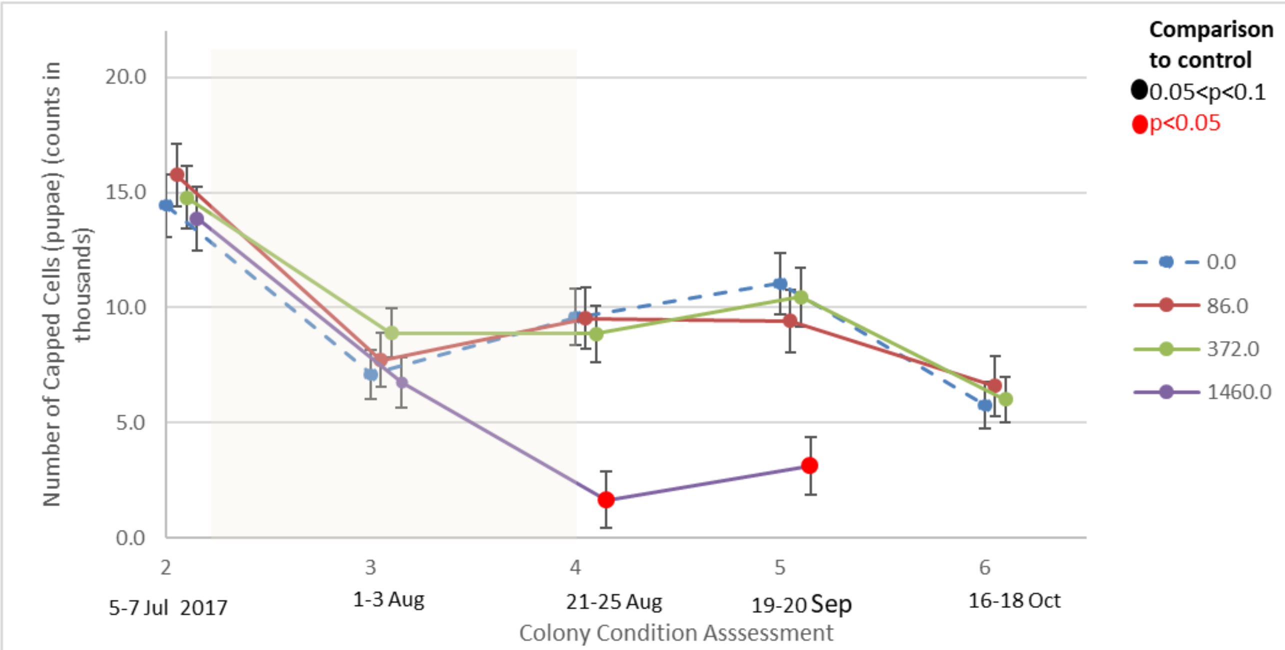


Figure 4. Number of capped cells (pupae). by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

Food Storage: The amount of stored bee bread (pollen) steadily decreased in all treatments and control groups between CCA2 and CCA3. This is expected as the pollen traps for all colonies were activated during the treatment period (beginning day 0). As incoming pollen from foraging was minimized, numbers of pollen storage cells would be expected to decline. The study authors noted that they did not expect that the bees would move the provided pollen patties into storage cells to compensate for the reduced incoming foraged pollen. Rather, they expected that any reduction in the pollen patty would represent actual food consumption. After the treatment period when the pollen traps were de-activated, bee bread stores were remaining at similar levels and never returned to levels observed before pollen trap activation even in the control colonies.

While pollen stores were never significantly lower in the 86 and 372 µg/kg treatment groups at any assessment point, for the 1460 µg/kg treatment, pollen stores were significantly lower beginning with CCA4.

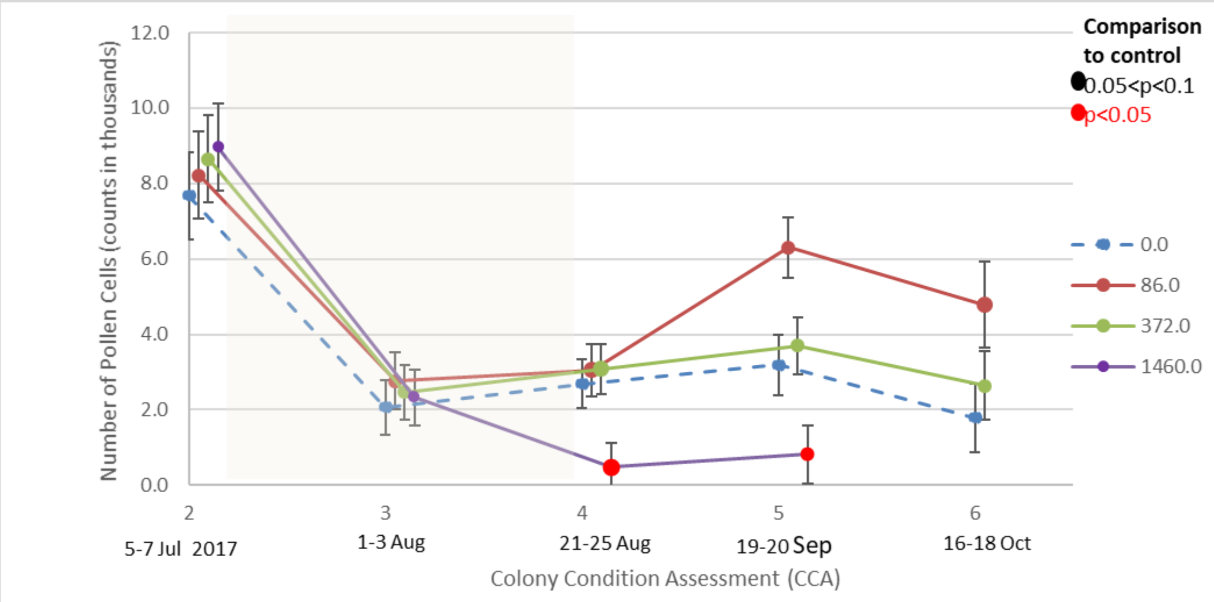


Figure 5. Bee bread (pollen stores) by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

The reviewer found no significant differences between any treatment means and control means for honey storage (**Figure 6**). However, for uncapped nectar alone (**Figure 7**), the reviewer found statistically significant decreases ($p<0.05$) at the 1460 µg/kg treatment group at CCAs 4 and 5, as well as significant decreases at the 372 µg/kg at CCA4 ($p<0.10$) and CCAs 5 and 6 ($p<0.05$), showing a dose-response relationship. The reviewer also evaluated combined nectar and honey stores (**Figure 8**) and only found significant differences at the 1460 µg/kg treatment level at both CCAs 4 and 5 ($p<0.05$). For nectar/honey endpoints, the study author only statistically evaluated the combined nectar plus honey endpoint, and reached an identical conclusion as the reviewer for this endpoint. As adult bee strength was significantly impacted at CCA3, this reduction in food stores is not unexpected given that colonies in the highest treatment level were observed to be dwindling in strength, likely consuming the stored honey and reducing the ability of foragers to bring in additional nectar.

Overall, although the effects to uncapped nectar does appear to show clear and consistent effects to the mid-treatment group, nectar storage is not an apical endpoint, directly affecting hive survival, growth and/or reproduction and given the lack of significant impacts to honey storage and combined honey and nectar storage at the 372 µg/kg treatment level at any CCA, the impact of reduced uncapped nectar storage on colony apical endpoints is highly uncertain.

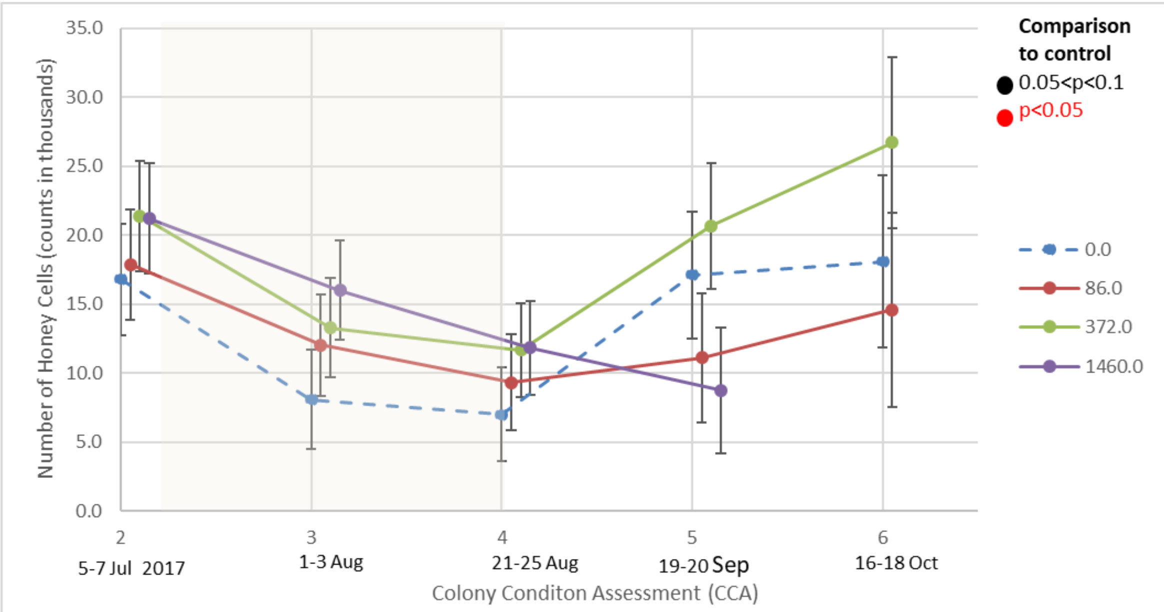


Figure 6. Honey stores by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

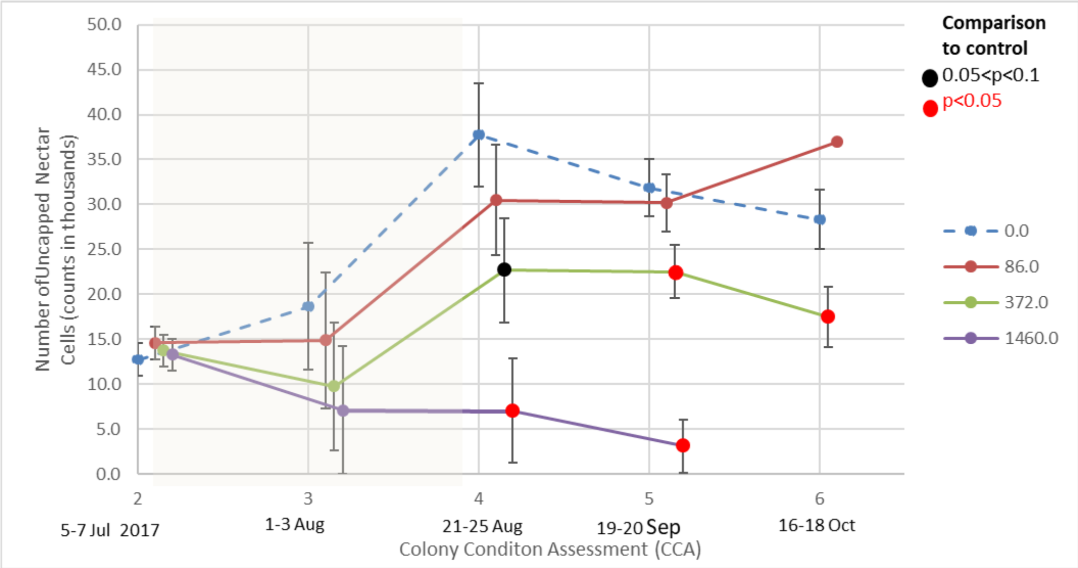


Figure 7. Nectar stores by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

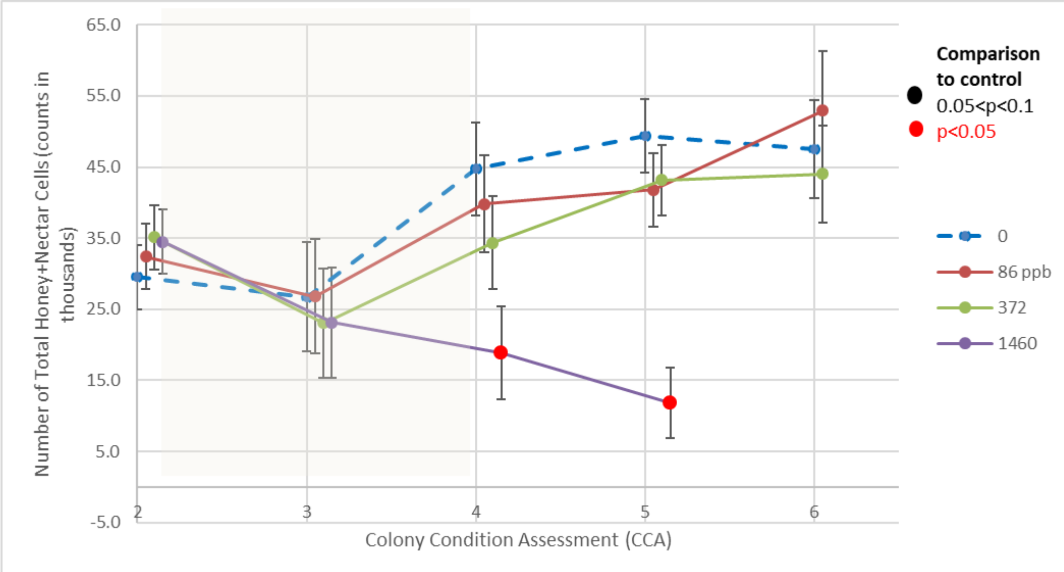


Figure 8. Honey plus nectar by treatment and CCA. Shaded area represents exposure period. Error bars represent standard error.

<u>Hive Weights</u>: The weights of each hive were recorded seven times during the study, once after setup of the hives, but before start of feeding, three times during feeding and three times after start of feeding. Hive weights were generally recorded around the dates of the colony condition assessments.

As supers were added to some hives and removed from others during the study, changes in hive weights, particularly in the 1460 µg/kg treatment group may reflect more management of the hives rather than true treatment effects. Due to this confounding factor, no statistical analyses of hive weights were performed.

<u>Food Consumption</u>: Consumption of the provided pollen patties were quite variable through the course of the study. Overall the 86 and 372 µg/kg treatment groups followed a similar trend to the controls. The study authors reported that total pollen patty consumption in the 372 µg/kg (mean total consumption 1.15 kg) treatment group was significantly lower than the controls (mean total consumption 1.51 kg) and suggested this may reflect a level close to the threshold for unpalatability of the test material.

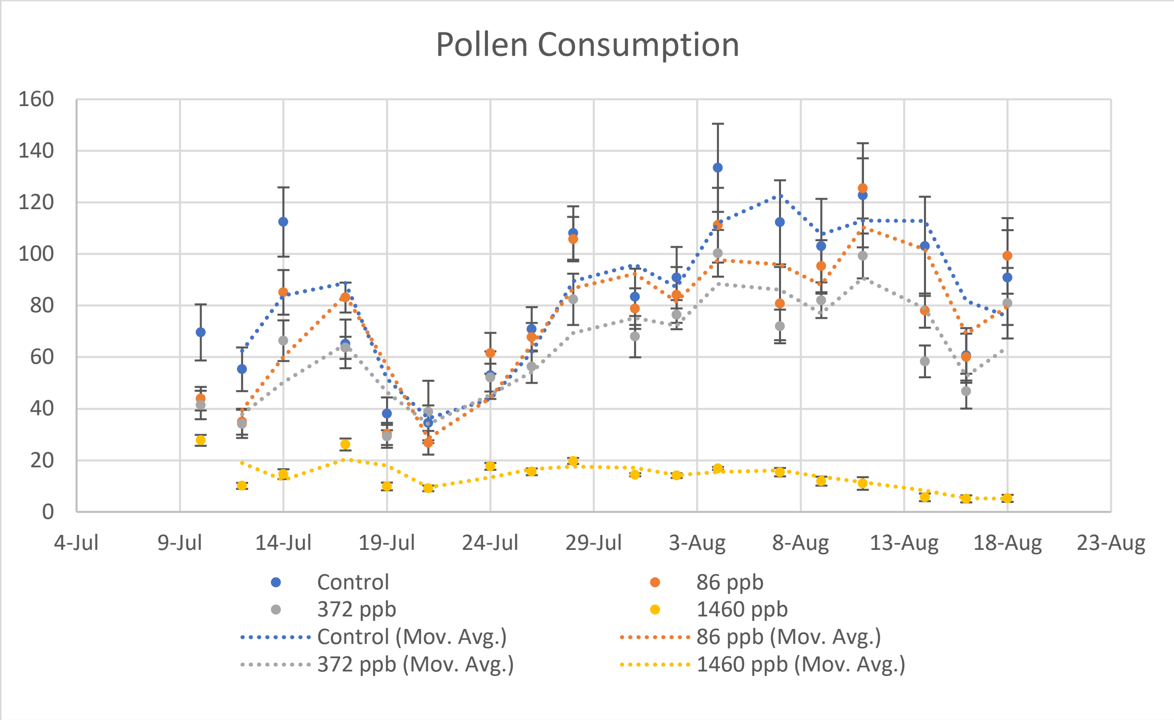


Figure 9. Pollen consumption. Outlier removed from 1460 µg/kg data point removed; see text.

In the 1460 µg/kg treatment group, consumption of the pollen patties was dramatically lower than the controls. This was reflected at all time points during the treatment period. In the above graph a consumption endpoint that was 2 to 3 orders of magnitude higher than any other (206 mg) was removed from the dataset. There was little effect on the trendline but the error bars are smaller. Based on this food consumption data and the mean measured residues in pollen patties, the total mean dose consumed over the treatment period in treatment hives was 116, 427 and 402 µg a.i./colony

<u>Residues</u>: The residues of Clothianidin in samples of pre-feeding and post-feeding patties were quantified for dose verification and stability at three of the feeding time points. No clothianidin was detected in any control pollen patties sampled. For nominal test levels of 100, 400, and 1600 µg/kg, average pollen patty concentrations were measured as 86, 372, and 1460 µg/kg with no appreciable change in clothianidin concentrations with samples averaging 101, 108 and 102 % of initial measured concentrations.

Uncapped nectar samples were collected from all viable hives at the end of the treatment period. No clothianidin was detected in any control hive. One hive in T1 had a sample with a clothianidin detection and most hives in the T2 and T3 had sample with detections.

However, none of the samples in any treatment group had levels above the level of quantitation (1 µg/kg).

Samples of hive stored bee bread were also sampled at the end of the treatment period. No detections of clothianidin occurred in any sample from the control and T1 treatment group. In the T2 group, four of eight samples had clothianidin detections and in the T3 group, one of five samples had clothianidin detections. None of the samples in any treatment group had clothianidin levels above the limit of quantitation.

These residue results from the in-hive matrix sampling at the end of the treatment period indicate very limited movement of the test material from the treated pollen patties into the food stores of the hives. This could be explained be contact transfer of the test material from the pollen patties to other parts of the hive as the bees move through the hive as well as more immediate consumption of fresh pollen, rather than any direct transfer and storage of pollen patty into hive cells.

	Hive Matrix	**Uncapped Nectar**	**Beebread**
	Assessment	**CCA4**	**CCA4**
Measured Concentrations	**Control**	< LOD	< LOD
	86 µg/kg	<LOD	<LOD
	372 µg/kg	<LOQ	<LOD
	1460 µg/kg	<LOQ	<LOD

14. REVIEWER'S COMMENTS

Colony Condition Assessments (CCA1) were initiated on 21 – 22 Jun 2017. The experimental GLP-phase (field) was June 21, 2017 to October 18, 2017 Study completion date was January 12, 2018.

Signed and Dated No Data Confidentiality, GLP, and Quality Assurance statements were provided. This study was conducted in accordance with 40 CFR 160 Good Laboratory Practice.

Strongly significant ($p<0.05$) and consistent effects were observed in the 1460 µg/kg treatment group with effects observed in nearly all assessment endpoints and overall colony survival. Slightly significant ($p<0.10$) differences in egg counts were observed at one CCA in the 372 µg/kg treatment group, but this was not considered a consistent adverse effect. Treatment-related effects on uncapped nectar storage and pollen patty consumption were observed at the 372 µg/kg and 1460 µg/kg treatment groups, however these are not considered apical endpoints. Additionally, total honey and nectar production at the 372 µg/kg treatment group were not significantly different from controls. Further, the concurrently conducted sucrose colony feeding study (MRID 50312501) found that effects observed on food storage (pollen storage at the biological NOAEC of 19 µg/kg) did not impact overall colony survival, even following overwintering (see DER for MRID 50312501 for more details). Therefore the biological NOAEC and LOAEC for this study, based on consistent effects to apical endpoints is concluded to be 372 and 1460 µg/kg, respectively.

15. REFERENCES

IMDORF & GERIG (1999): Lehrgang zur Erfassung der Volksstärke, Schweizerisches Zentrum für Bienenforschung. [Course in Determination of Colony Strength, Swiss Bee Research Center].

IMDORF, A.; BUEHLMANN, G.; GERIG, L.; KILCHMANN, V. AND WILLE, H. (1987): Überprüfung der Schätzmethode zur Ermittlung der Brutfläche und der Anzahl Arbeiterinnen in freifliegenden Bienenvölkern, Apidologie 18 (2), 137 – 146. [A Verification of the Method for Estimation of Brood Areas and Number of Worker Bees in Free-Flying Bee Colonies].

SAS INSTITUTE INC. 2002-2010. SAS® Proprietary, Software 9.3; Cary, NC, USA.

All other references are standard guidelines and methodologies.

Appendix 1. Statistical Output

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - adult_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	adult_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations

Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	663.47556340	
1	2	625.20752688	0.00182822
2	1	624.78578973	0.00016612
3	1	624.75037372	0.00000216
4	1	624.74993892	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		0.09533
Var(1)	**Treatme*hive(Apiary)**	7.8387
Var(2)	**Treatme*hive(Apiary)**	9.6272
Var(3)	**Treatme*hive(Apiary)**	13.8678
Var(4)	**Treatme*hive(Apiary)**	9.9044
Var(5)	**Treatme*hive(Apiary)**	3.4227
CSH	**Treatme*hive(Apiary)**	0.4456

Fit Statistics

-2 Res Log Likelihood	624.7
AIC (Smaller is Better)	638.7
AICC (Smaller is Better)	639.7
BIC (Smaller is Better)	634.5

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	23.7	17.17	<.0001

Type 3 Tests of Fixed Effects

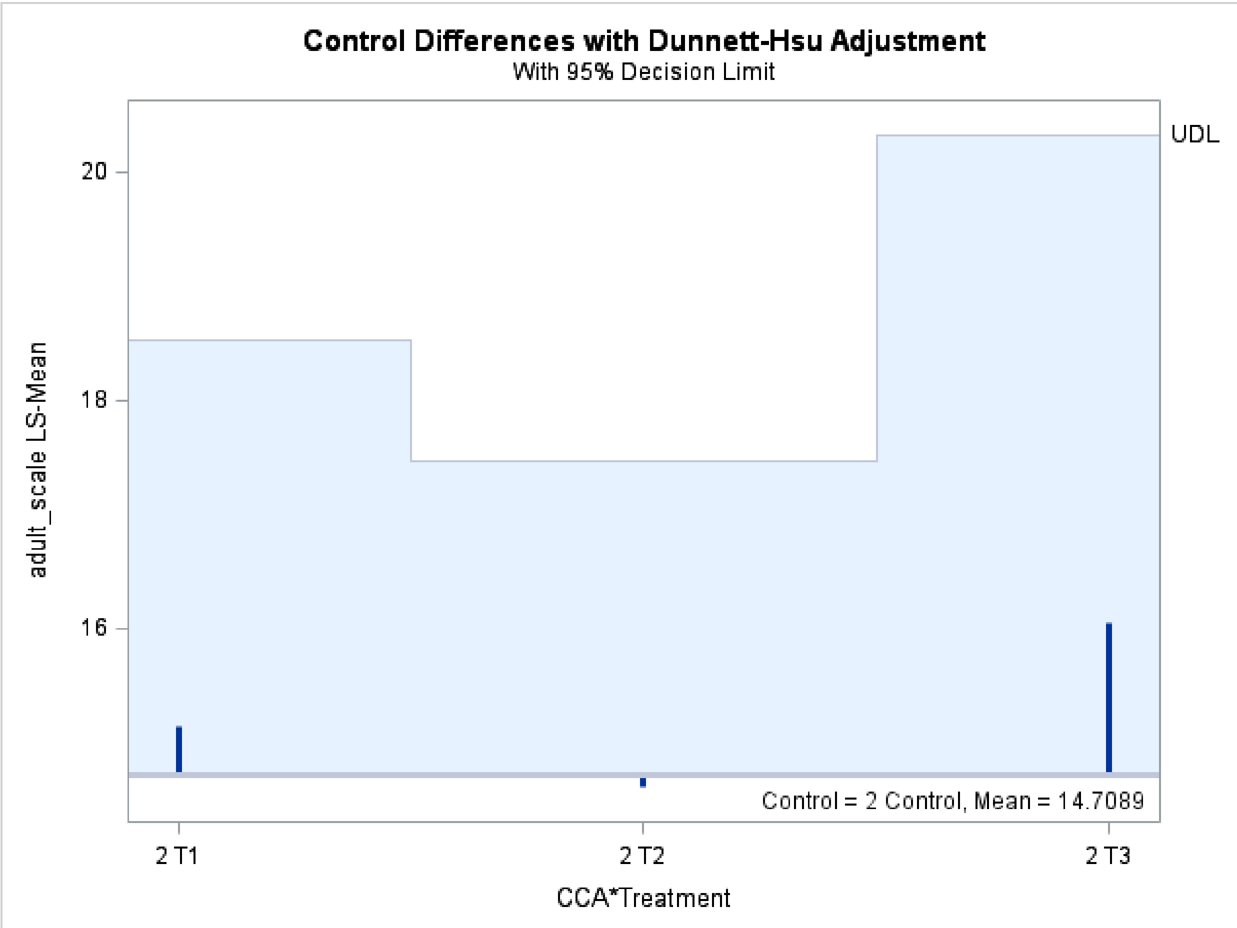
Effect	Num DF	Den DF	F Value	Pr > F
CCA	4	54.4	117.54	<.0001
CCA*Treatment	11	58	10.66	<.0001

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	15.2	0.44	0.7304

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	**Control**	**T1**	-0.4400	1.3999	15.2	-0.31	0.6212	0.8492
CCA 2	**Control**	**T2**	0.09800	1.3999	15.2	0.07	0.4726	0.7240
CCA 2	**Control**	**T3**	-1.3346	1.3999	15.2	-0.95	0.8223	0.9608

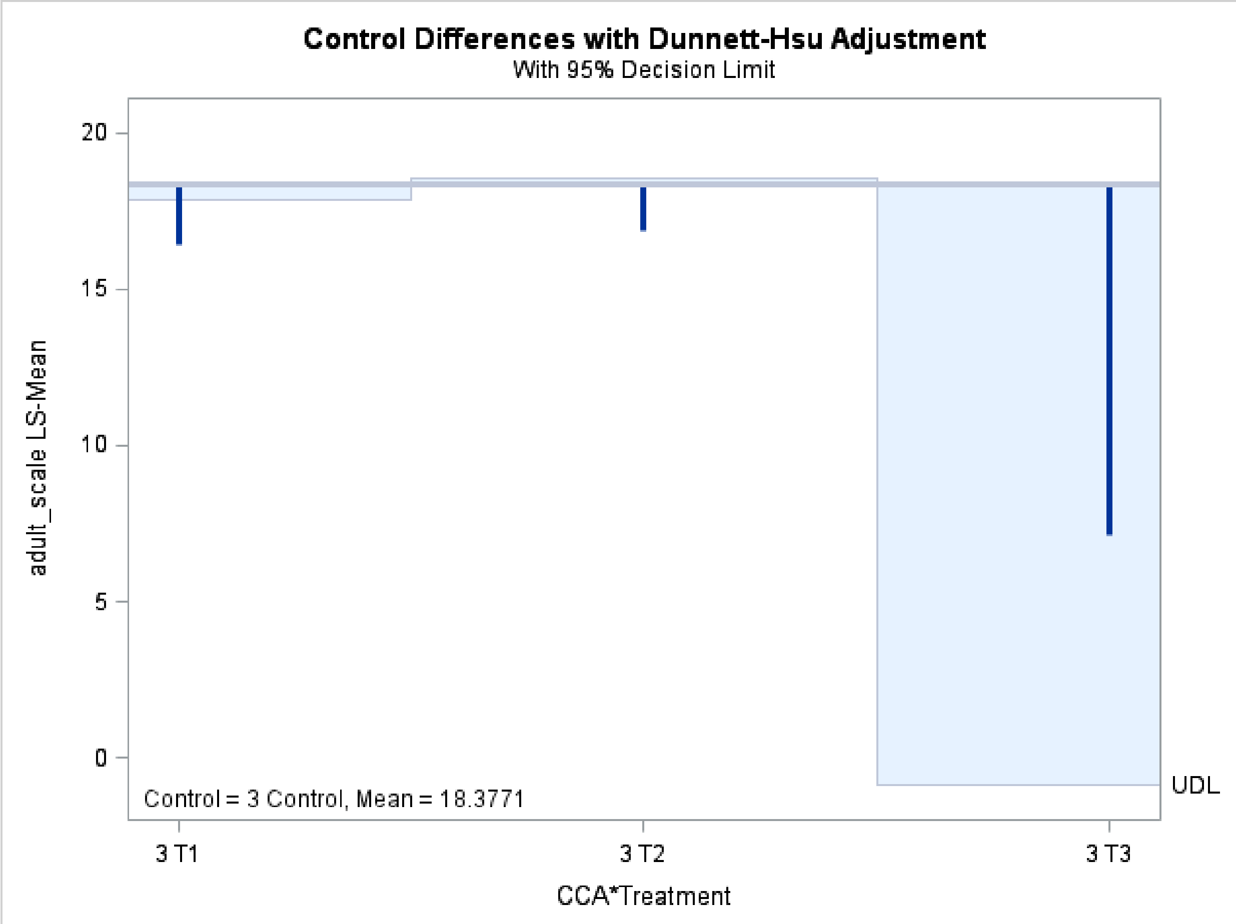


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	28.9	21.71	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	1.9378	1.5953	29.13	1.21	0.1171	0.2460
CCA 3	**Control**	**T2**	1.5374	1.5514	28.69	0.99	0.1650	0.3302
CCA 3	**Control**	**T3**	11.2639	1.5514	28.69	7.26	<.0001	<.0001

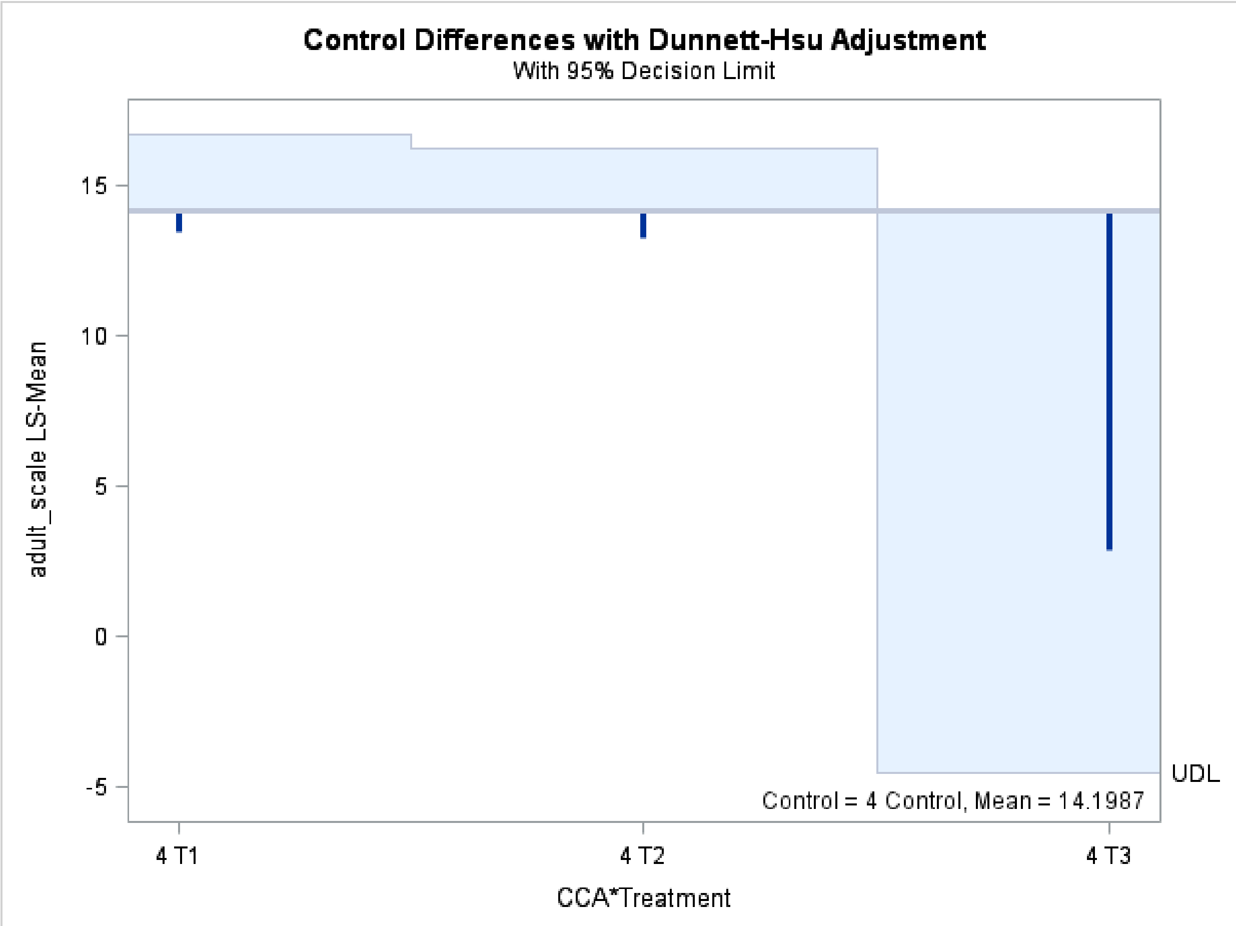


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	27.09	16.66	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	0.7598	1.9146	27.36	0.40	0.3473	0.5908
CCA 4	**Control**	**T2**	0.9505	1.8620	26.84	0.51	0.3069	0.5401
CCA 4	**Control**	**T3**	11.3268	1.8620	26.84	6.08	<.0001	<.0001

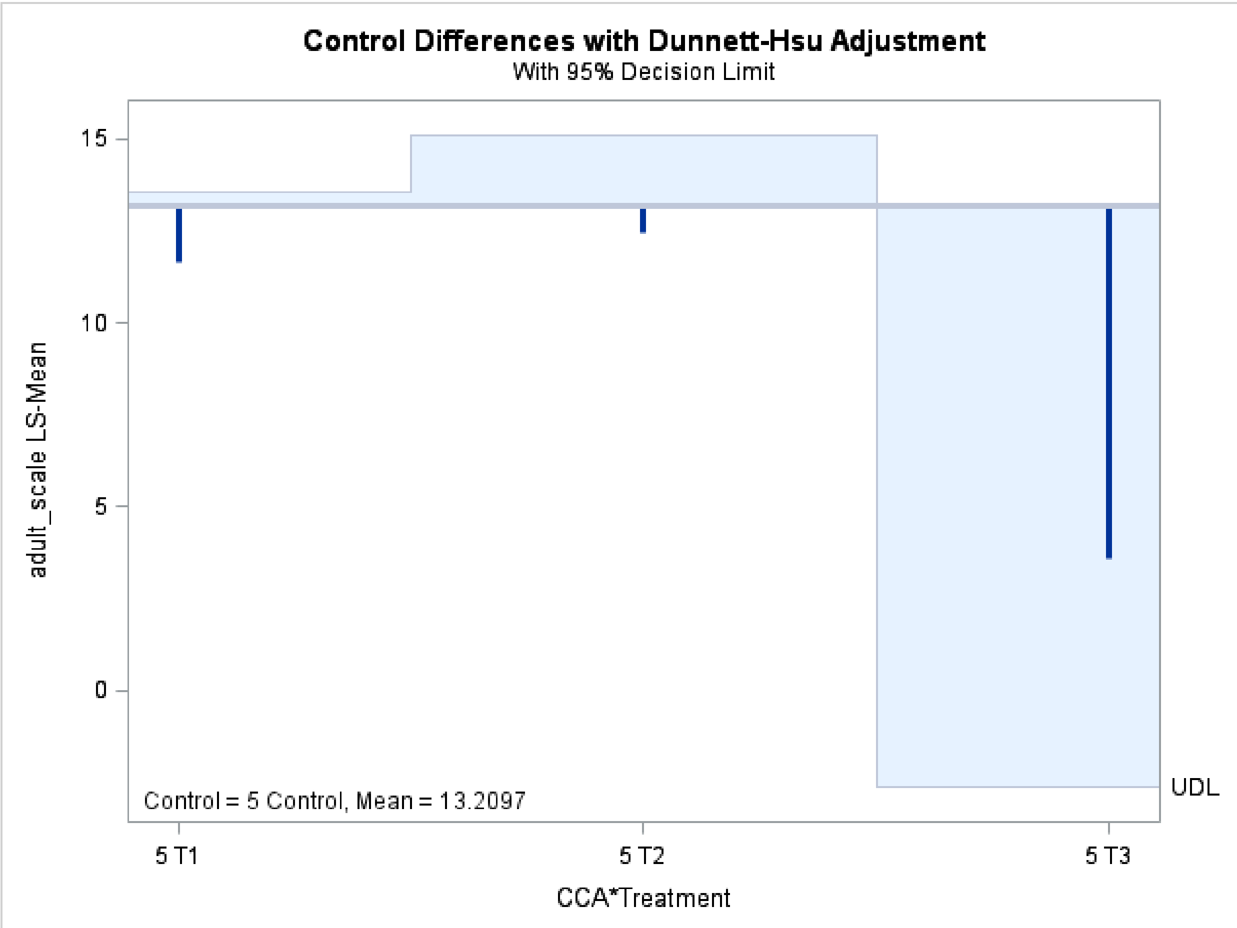


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	23.75	15.83	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	1.5730	1.6552	24.27	0.95	0.1756	0.3422
CCA 5	**Control**	**T2**	0.7438	1.6116	23.81	0.46	0.3243	0.5557
CCA 5	**Control**	**T3**	9.6111	1.6116	23.81	5.96	<.0001	<.0001

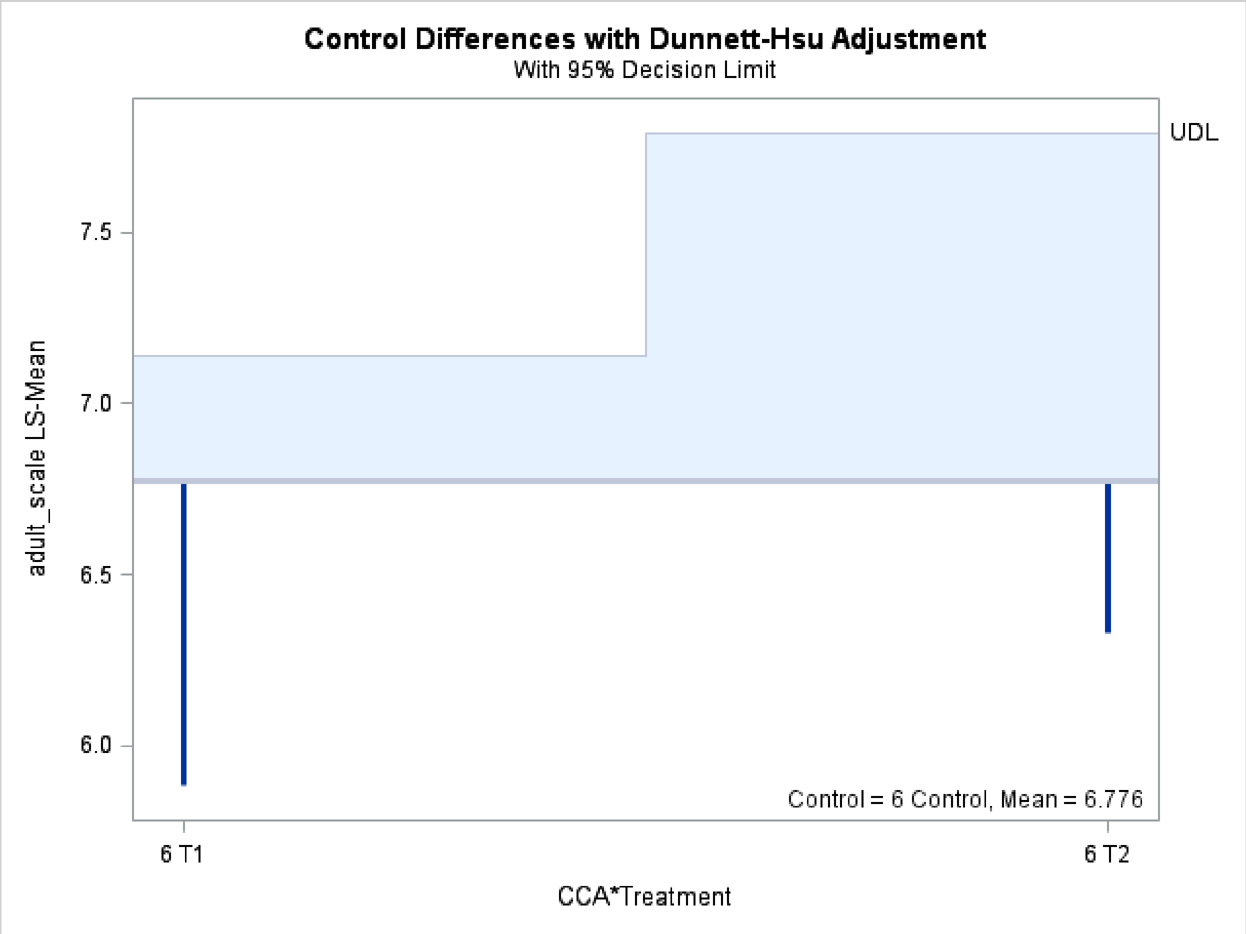


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	19.93	0.34	0.7168

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	0.8914	1.0927	20.08	0.82	0.2121	0.3314
CCA 6	**Control**	**T2**	0.4438	0.9690	19.83	0.46	0.3260	0.4818

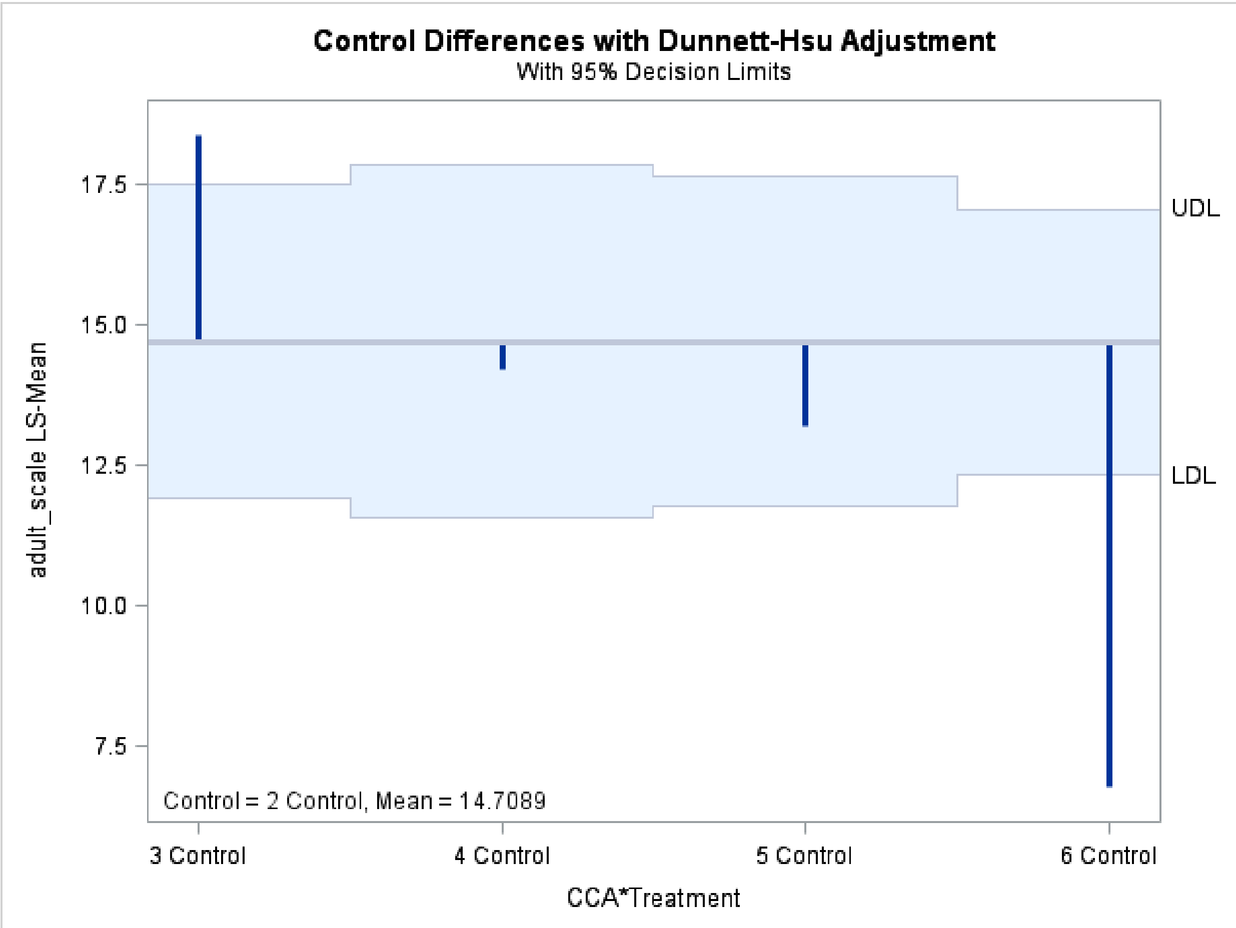


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	52.97	38.74	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	3.6683	1.1025	52.39	3.33	0.0016	0.0057
Treatment Control	**4**	**2**	-0.5101	1.2457	47.32	-0.41	0.6840	0.9842
Treatment Control	**5**	**2**	-1.4992	1.1652	44.76	-1.29	0.2048	0.5280
Treatment Control	**6**	**2**	-7.9329	0.9343	31.52	-8.49	<.0001	<.0001

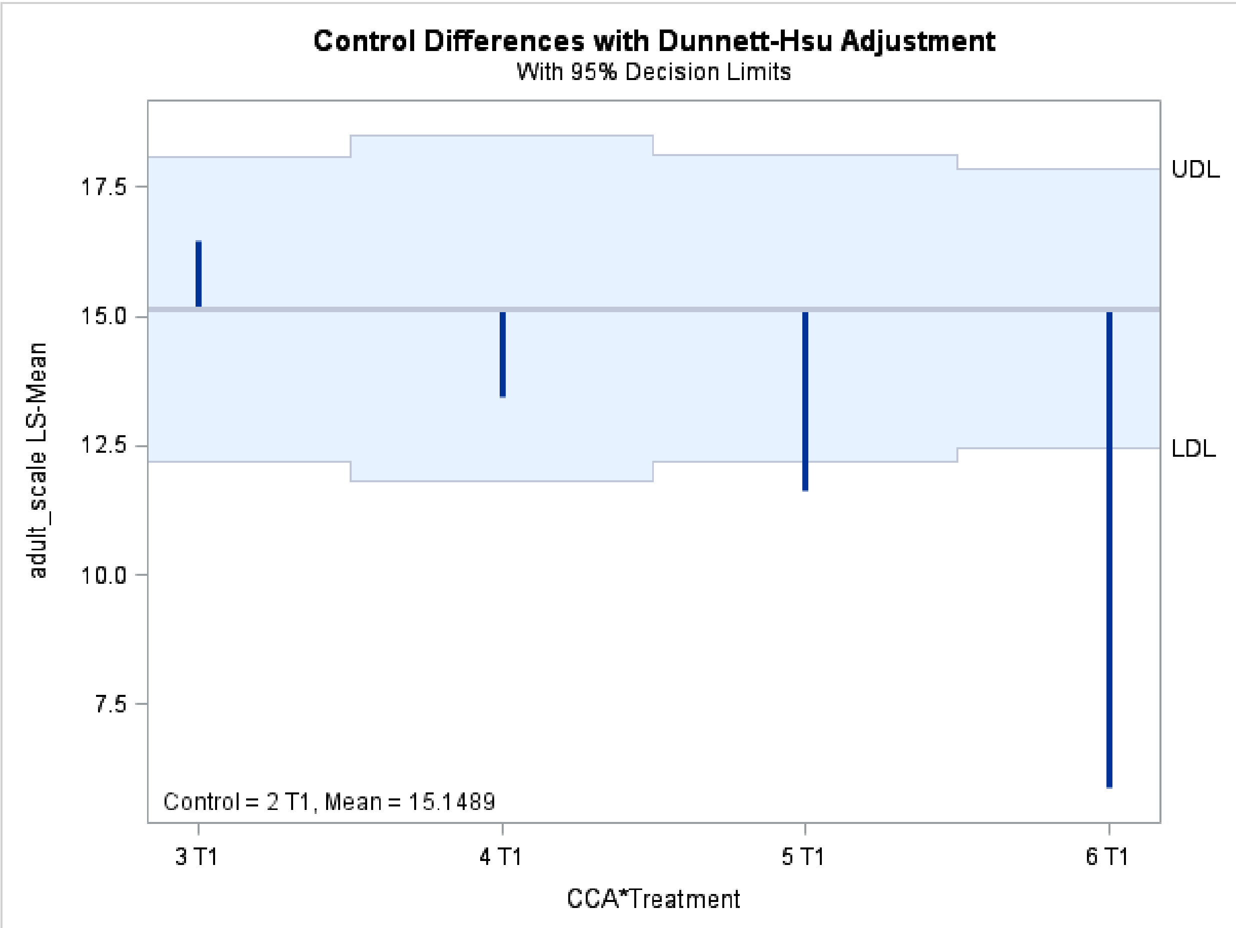


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	48.5	27.15	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	1.2905	1.1635	52.85	1.11	0.2724	0.6598
Treatment T1	**4**	**2**	-1.7099	1.3231	46.32	-1.29	0.2026	0.5318
Treatment T1	**5**	**2**	-3.5122	1.1741	45.12	-2.99	0.0045	0.0151
Treatment T1	**6**	**2**	-9.2643	1.0623	45.64	-8.72	<.0001	<.0001

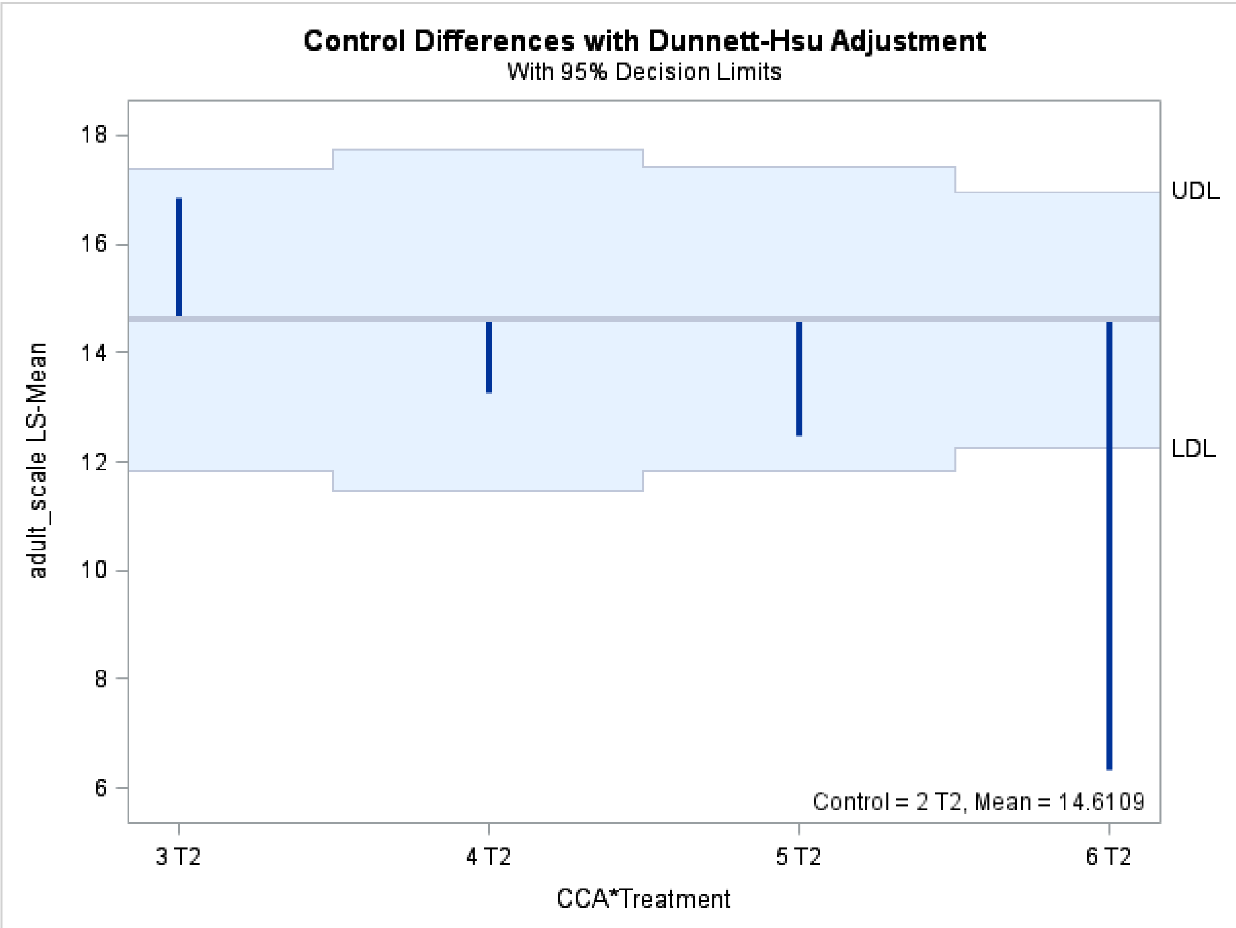


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	50.01	34.77	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	2.2289	1.1025	52.39	2.02	0.0483	0.1525
Treatment T2	**4**	**2**	-1.3626	1.2457	47.32	-1.09	0.2796	0.6604
Treatment T2	**5**	**2**	-2.1450	1.1119	44.82	-1.93	0.0601	0.1833
Treatment T2	**6**	**2**	-8.2787	0.9335	31.38	-8.87	<.0001	<.0001

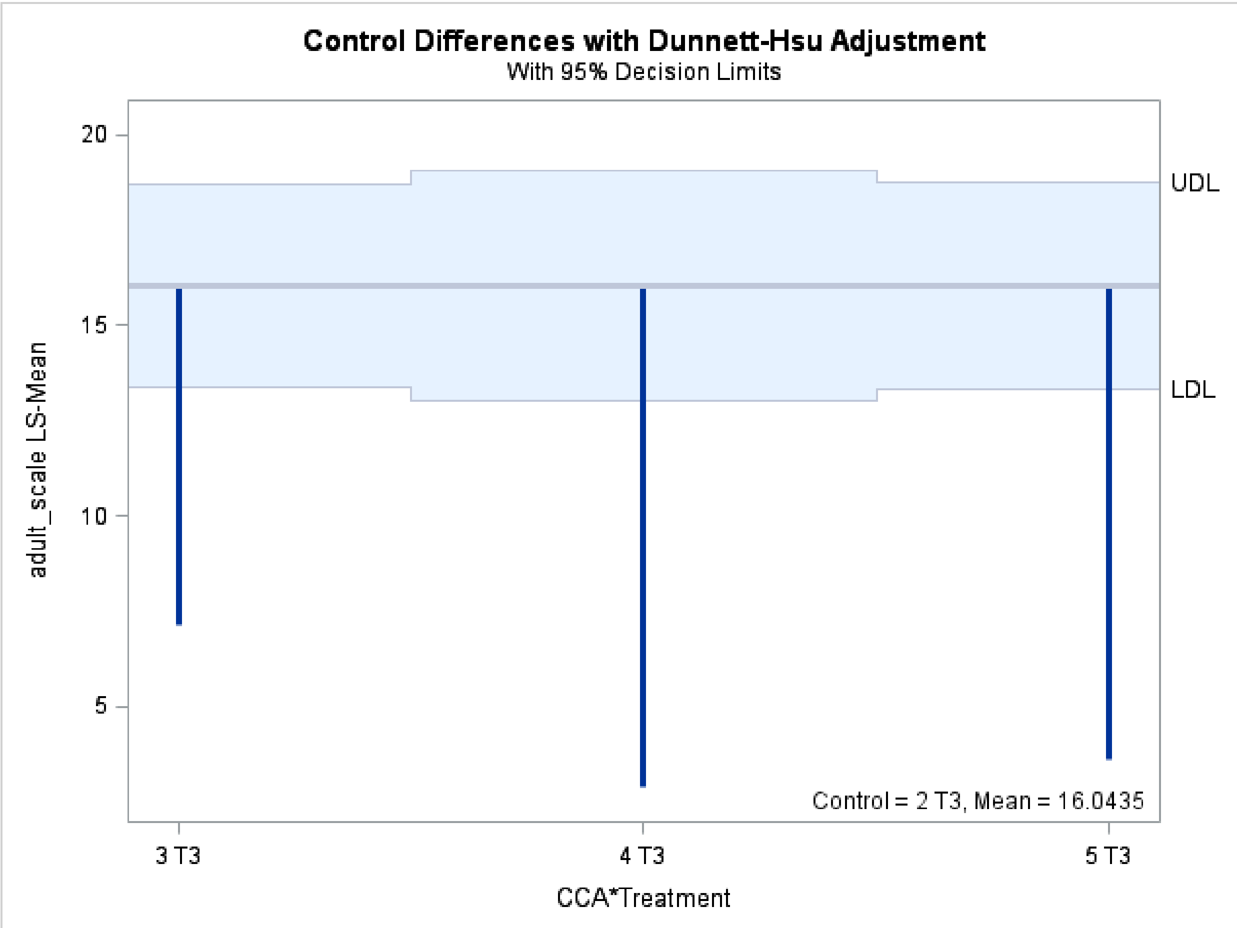


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	52.97	57.26	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-8.9302	1.1025	52.39	-8.10	<.0001	<.0001
Treatment T3	**4**	**2**	-13.1715	1.2457	47.32	-10.57	<.0001	<.0001
Treatment T3	**5**	**2**	-12.4449	1.1119	44.82	-11.19	<.0001	<.0001



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	14.7089	1.0018	26.3	14.68	<.0001	0.05	12.6508	16.7669
CCA*Treatment	**T1**	**2**	15.1489	1.0018	26.3	15.12	<.0001	0.05	13.0908	17.2069
CCA*Treatment	**T2**	**2**	14.6109	1.0018	26.3	14.58	<.0001	0.05	12.5528	16.6689
CCA*Treatment	**T3**	**2**	16.0435	1.0018	26.3	16.01	<.0001	0.05	13.9855	18.1015
CCA*Treatment	**Control**	**3**	18.3771	1.1078	20.9	16.59	<.0001	0.05	16.0728	20.6814
CCA*Treatment	**T1**	**3**	16.4394	1.1685	22.1	14.07	<.0001	0.05	14.0166	18.8621
CCA*Treatment	**T2**	**3**	16.8397	1.1078	20.9	15.20	<.0001	0.05	14.5354	19.1441
CCA*Treatment	**T3**	**3**	7.1132	1.1078	20.9	6.42	<.0001	0.05	4.8089	9.4176

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**4**	14.1987	1.3256	25.3	10.71	<.0001	0.05	11.4701	16.9274
CCA*Treatment	**T1**	**4**	13.4389	1.3986	26.3	9.61	<.0001	0.05	10.5659	16.3120
CCA*Treatment	**T2**	**4**	13.2482	1.3256	25.3	9.99	<.0001	0.05	10.5196	15.9769
CCA*Treatment	**T3**	**4**	2.8720	1.3256	25.3	2.17	0.0399	0.05	0.1433	5.6007
CCA*Treatment	**Control**	**5**	13.2097	1.1761	25.1	11.23	<.0001	0.05	10.7882	15.6312
CCA*Treatment	**T1**	**5**	11.6367	1.1849	25	9.82	<.0001	0.05	9.1965	14.0768
CCA*Treatment	**T2**	**5**	12.4659	1.1233	24	11.10	<.0001	0.05	10.1473	14.7845
CCA*Treatment	**T3**	**5**	3.5986	1.1233	24	3.20	0.0038	0.05	1.2800	5.9172
CCA*Treatment	**Control**	**6**	6.7760	0.7028	8.29	9.64	<.0001	0.05	5.1649	8.3871
CCA*Treatment	**T1**	**6**	5.8846	0.8657	10.1	6.80	<.0001	0.05	3.9587	7.8104
CCA*Treatment	**T2**	**6**	6.3322	0.7017	8.27	9.02	<.0001	0.05	4.7233	7.9410

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - eggs_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	eggs_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations

Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	488.21092173	
1	2	472.10150042	0.00013202
2	1	472.08475411	0.00000033
3	1	472.08471361	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		0.1716
Var(1)	**Treatme*hive(Apiary)**	2.4451
Var(2)	**Treatme*hive(Apiary)**	2.0812
Var(3)	**Treatme*hive(Apiary)**	2.8450
Var(4)	**Treatme*hive(Apiary)**	1.9996
Var(5)	**Treatme*hive(Apiary)**	0.5307
CSH	**Treatme*hive(Apiary)**	0.06091

Fit Statistics

-2 Res Log Likelihood	472.1
AIC (Smaller is Better)	486.1
AICC (Smaller is Better)	487.1
BIC (Smaller is Better)	481.8

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	23.3	2.24	0.1102
CCA	4	47	24.68	<.0001

Type 3 Tests of Fixed Effects

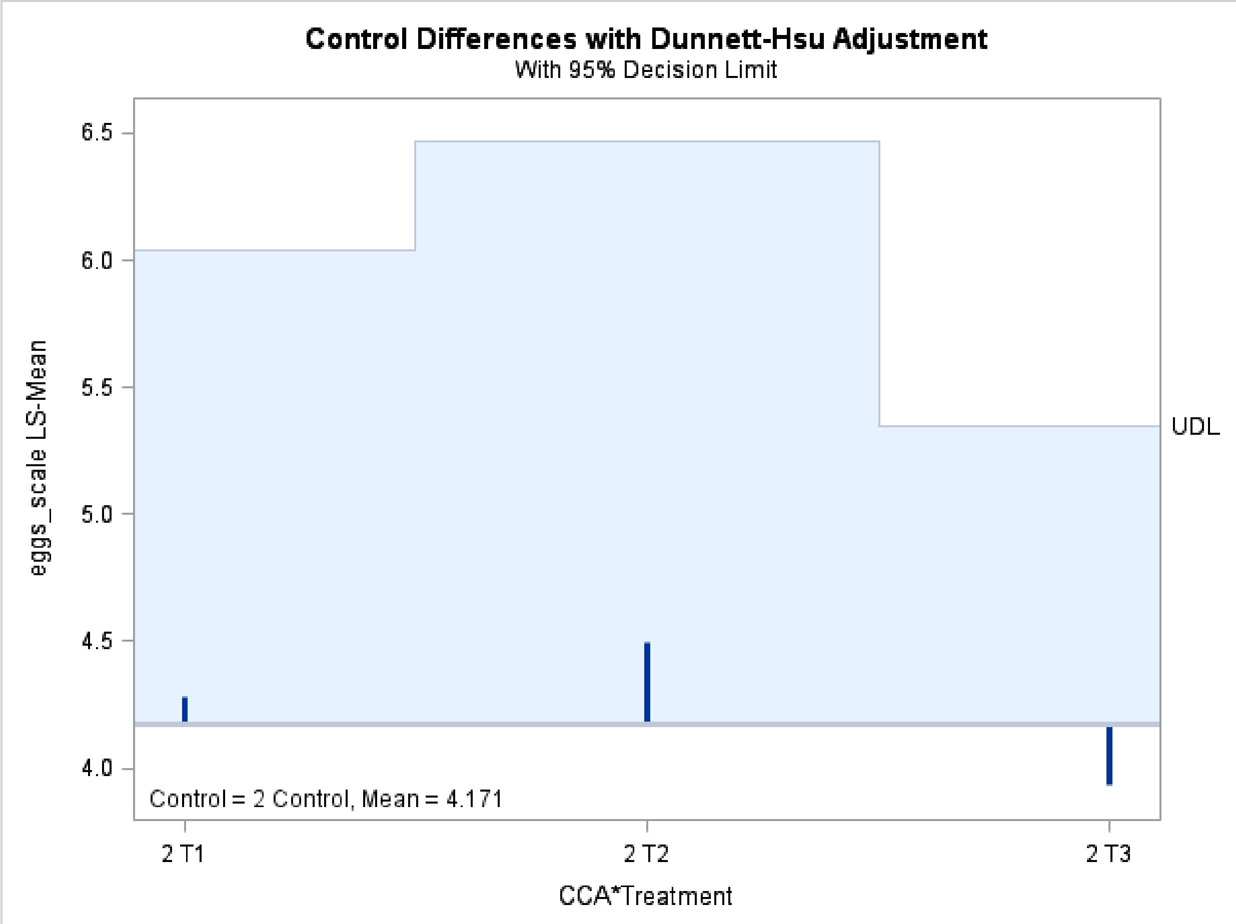
Effect	Num DF	Den DF	F Value	Pr > F
CCA*Treatment	11	52.3	1.92	0.0583

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	21.4	0.18	0.9109

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	**Control**	**T1**	-0.1075	0.7818	21.4	-0.14	0.5540	0.7971
CCA 2	**Control**	**T2**	-0.3225	0.7818	21.4	-0.41	0.6580	0.8739
CCA 2	**Control**	**T3**	0.2365	0.7818	21.4	0.30	0.3826	0.6294

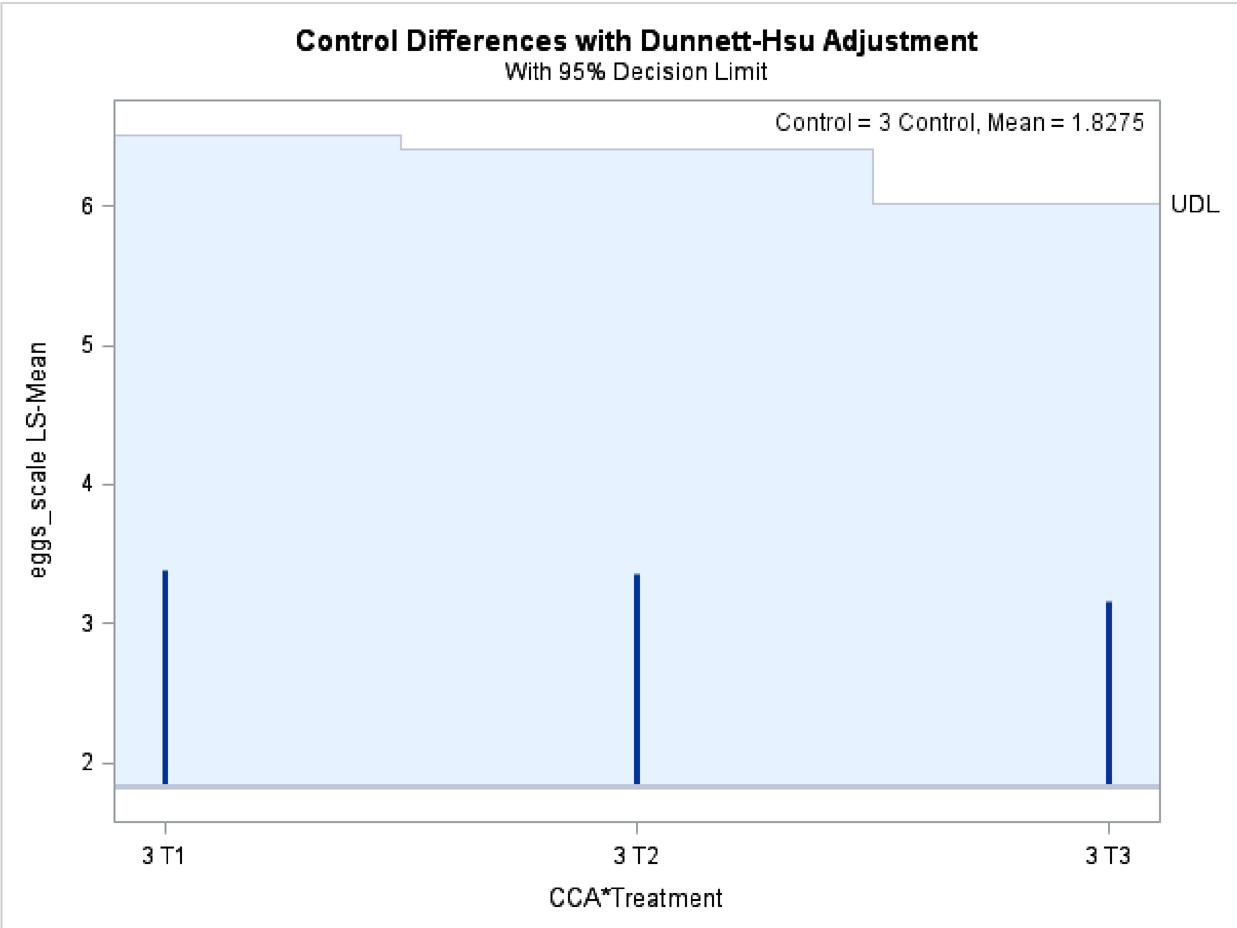


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	25.73	2.08	0.1276

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	-1.5512	0.7469	25.75	-2.08	0.9760	0.9987
CCA 3	**Control**	**T2**	-1.5265	0.7213	25.72	-2.12	0.9779	0.9989
CCA 3	**Control**	**T3**	-1.3330	0.7213	25.72	-1.85	0.9619	0.9972

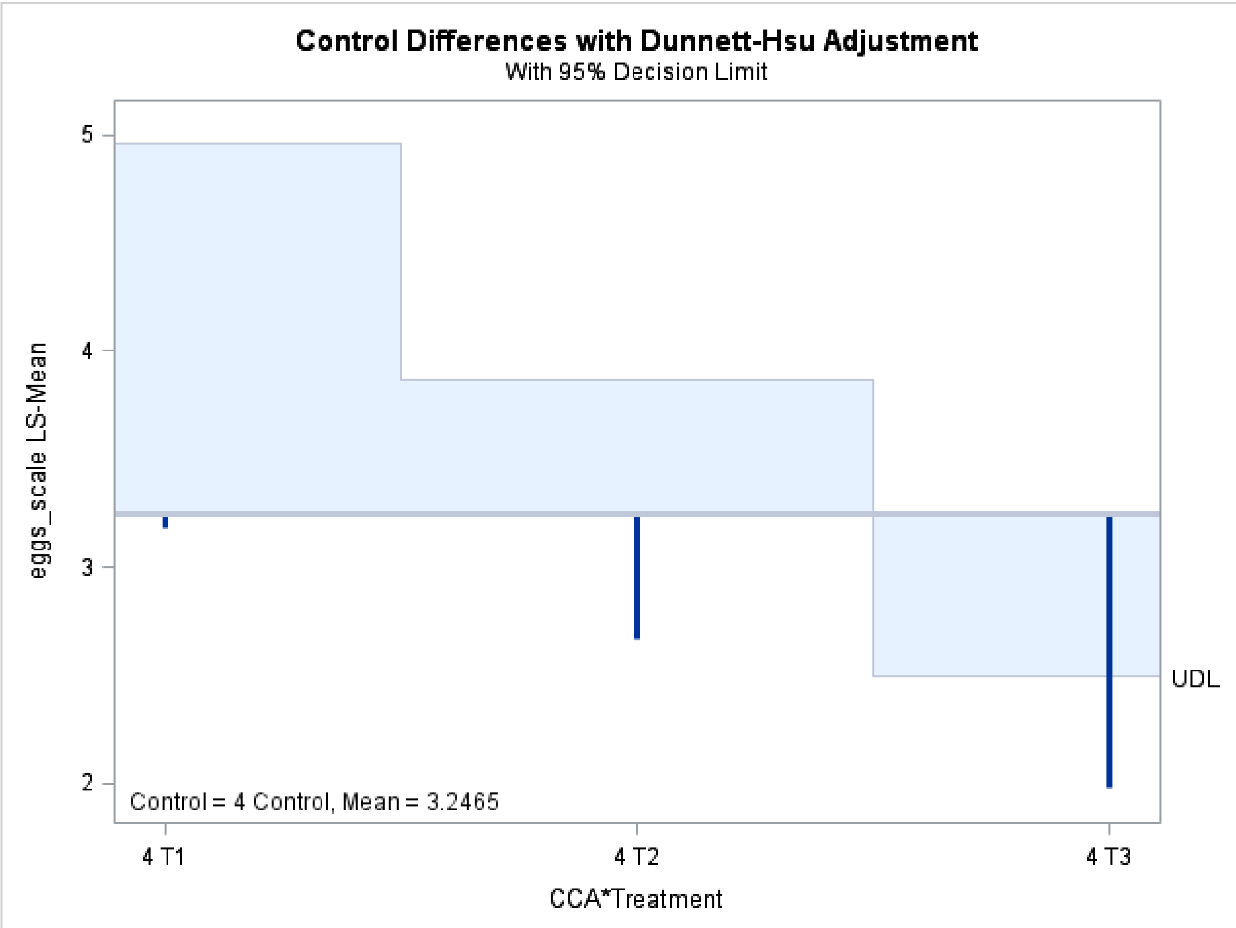


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	26.94	0.95	0.4305

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	0.06347	0.8732	26.96	0.07	0.4713	0.7261
CCA 4	**Control**	**T2**	0.5805	0.8434	26.92	0.69	0.2486	0.4608
CCA 4	**Control**	**T3**	1.2685	0.8434	26.92	1.50	0.0721	0.1585

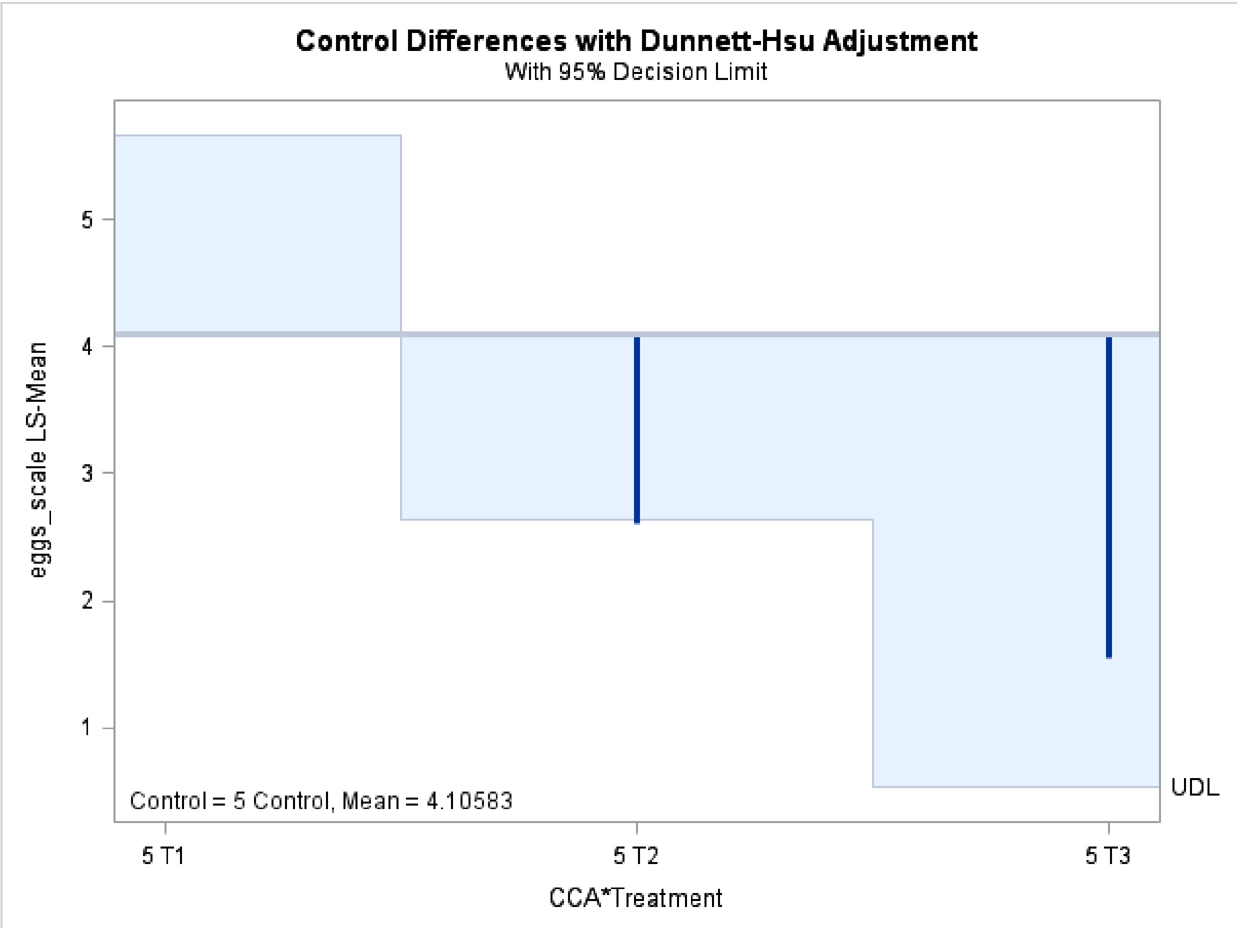


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	25.92	5.84	0.0035

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	0.01465	0.7565	26.01	0.02	0.4923	0.7367
CCA 5	**Control**	**T2**	1.5043	0.7320	25.92	2.06	0.0250	0.0555
CCA 5	**Control**	**T3**	2.5578	0.7320	25.92	3.49	0.0009	0.0014

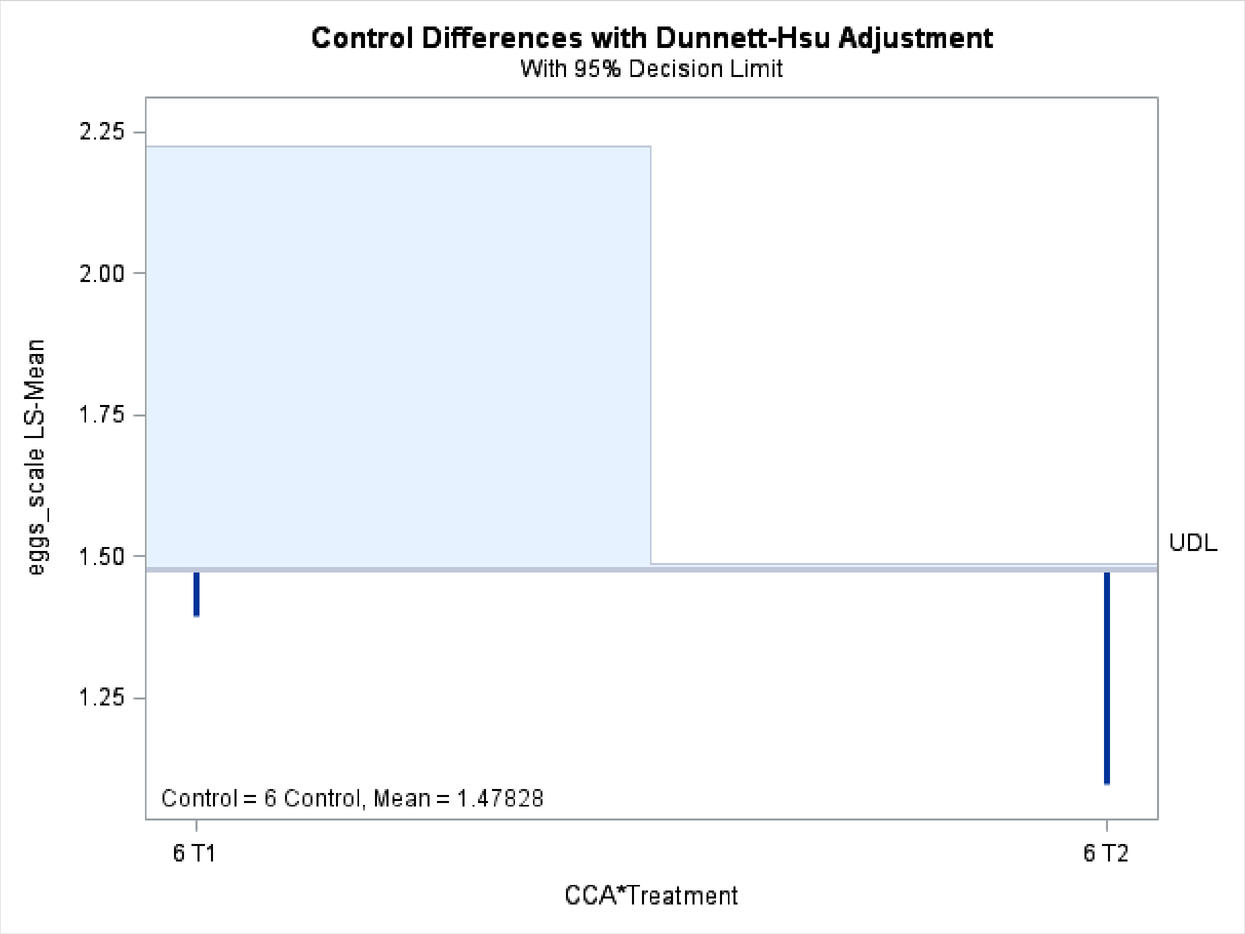


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	13.98	0.50	0.6149

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	0.08229	0.4635	14.05	0.18	0.4308	0.6099
CCA 6	**Control**	**T2**	0.3811	0.3910	13.45	0.97	0.1735	0.2752

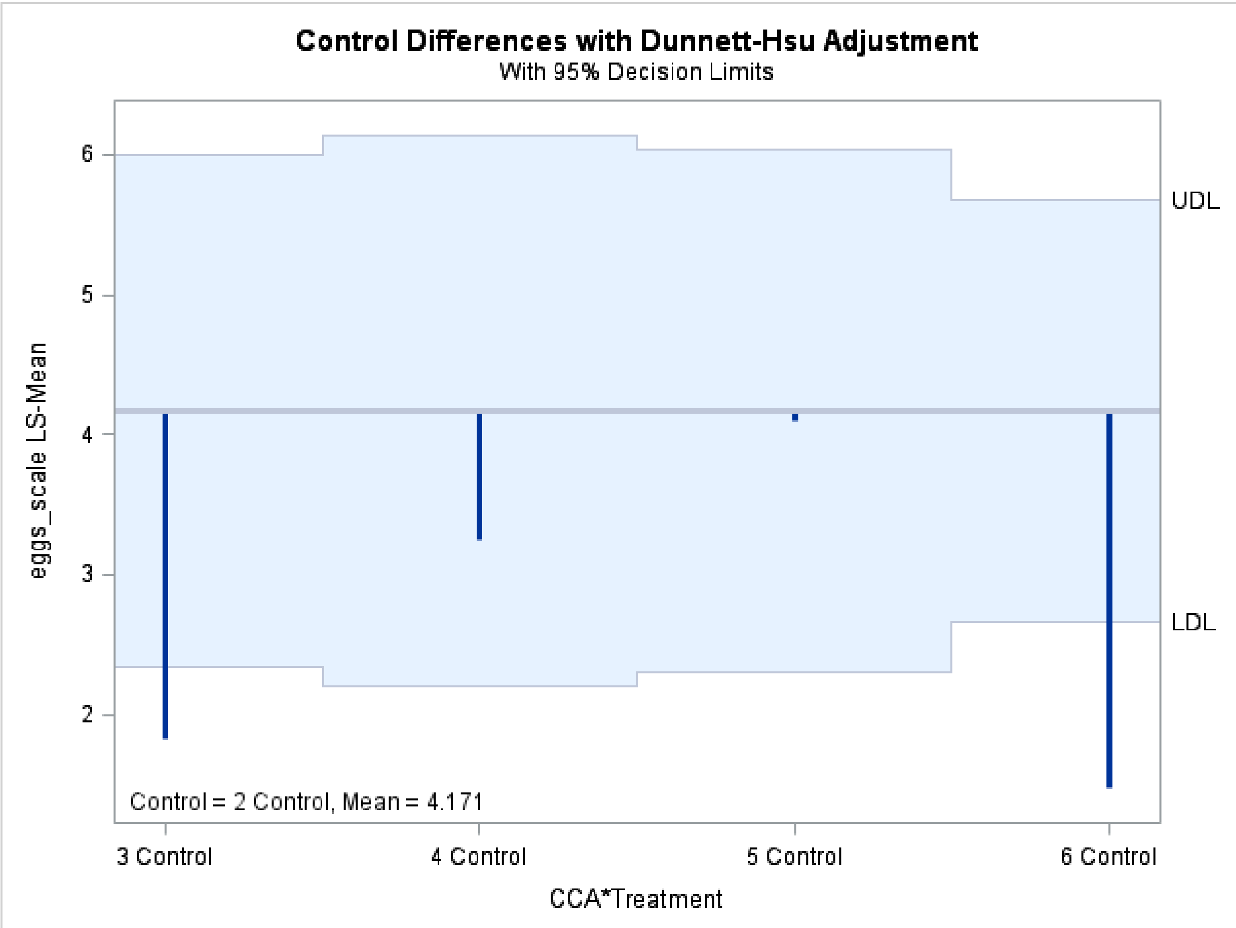


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	41.76	9.09	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	-2.3435	0.7290	49.47	-3.21	0.0023	0.0078
Treatment Control	**4**	**2**	-0.9245	0.7881	50.49	-1.17	0.2463	0.5650
Treatment Control	**5**	**2**	-0.06517	0.7468	46.33	-0.09	0.9308	0.9999
Treatment Control	**6**	**2**	-2.6927	0.6038	33.04	-4.46	<.0001	0.0002

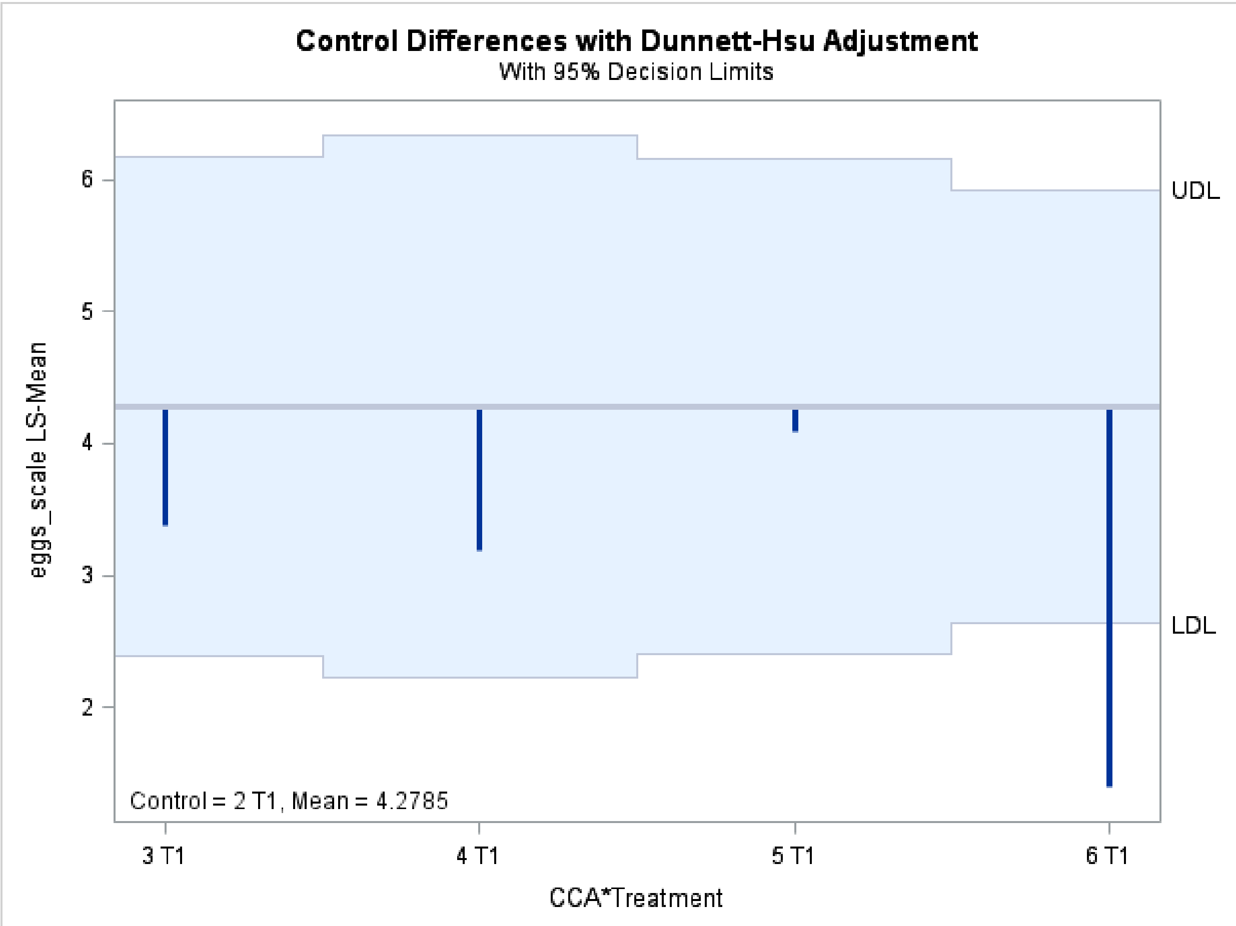


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	38.94	7.27	0.0002

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	-0.8998	0.7544	50.33	-1.19	0.2386	0.5667
Treatment T1	**4**	**2**	-1.0955	0.8199	50.44	-1.34	0.1875	0.4699
Treatment T1	**5**	**2**	-0.1873	0.7471	46.43	-0.25	0.8031	0.9970
Treatment T1	**6**	**2**	-2.8825	0.6553	38.34	-4.40	<.0001	0.0002

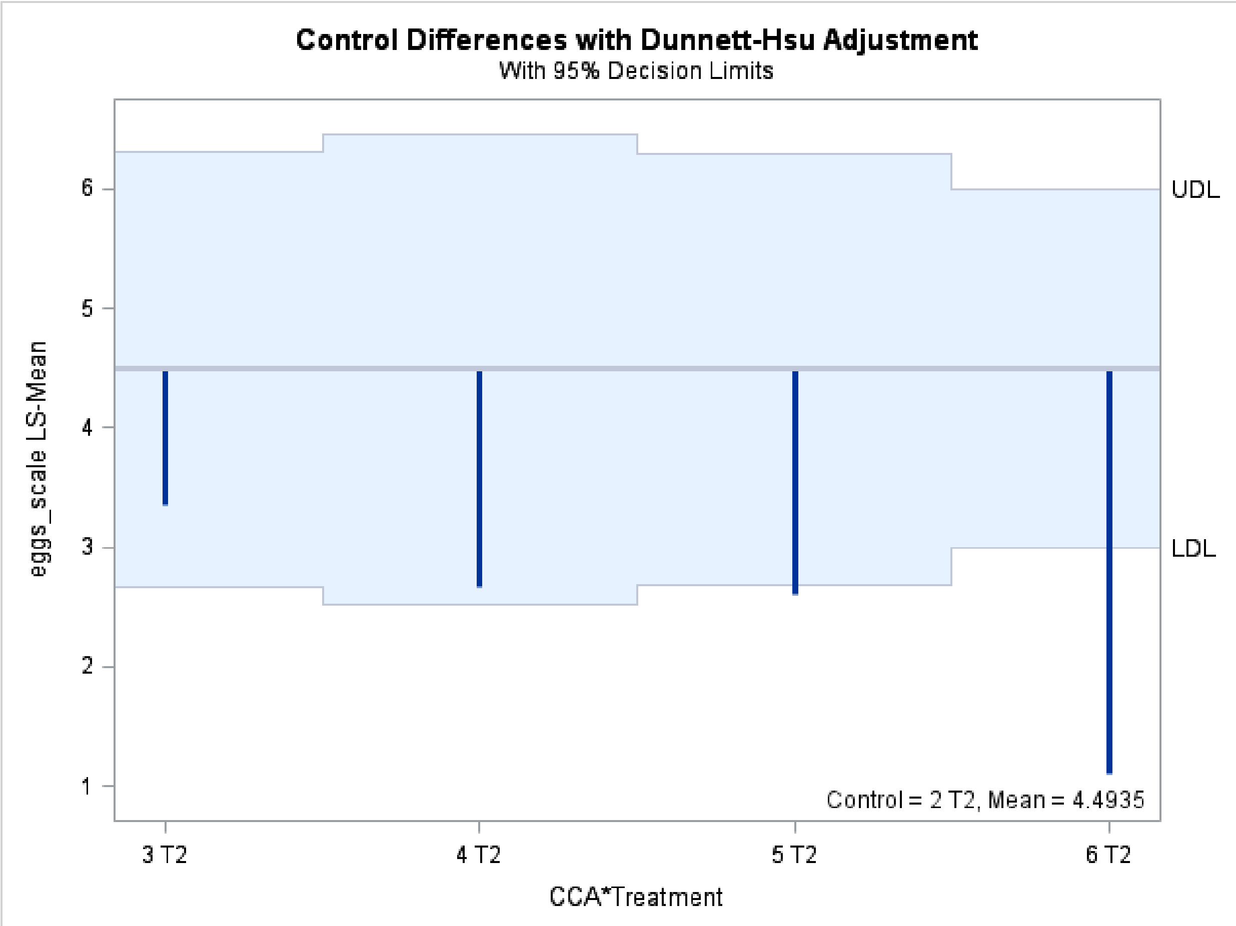


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	40.56	10.21	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	-1.1395	0.7290	49.47	-1.56	0.1244	0.3213
Treatment T2	**4**	**2**	-1.8275	0.7881	50.49	-2.32	0.0245	0.0746
Treatment T2	**5**	**2**	-1.8920	0.7224	45.56	-2.62	0.0119	0.0370
Treatment T2	**6**	**2**	-3.3963	0.6037	33.02	-5.63	<.0001	<.0001

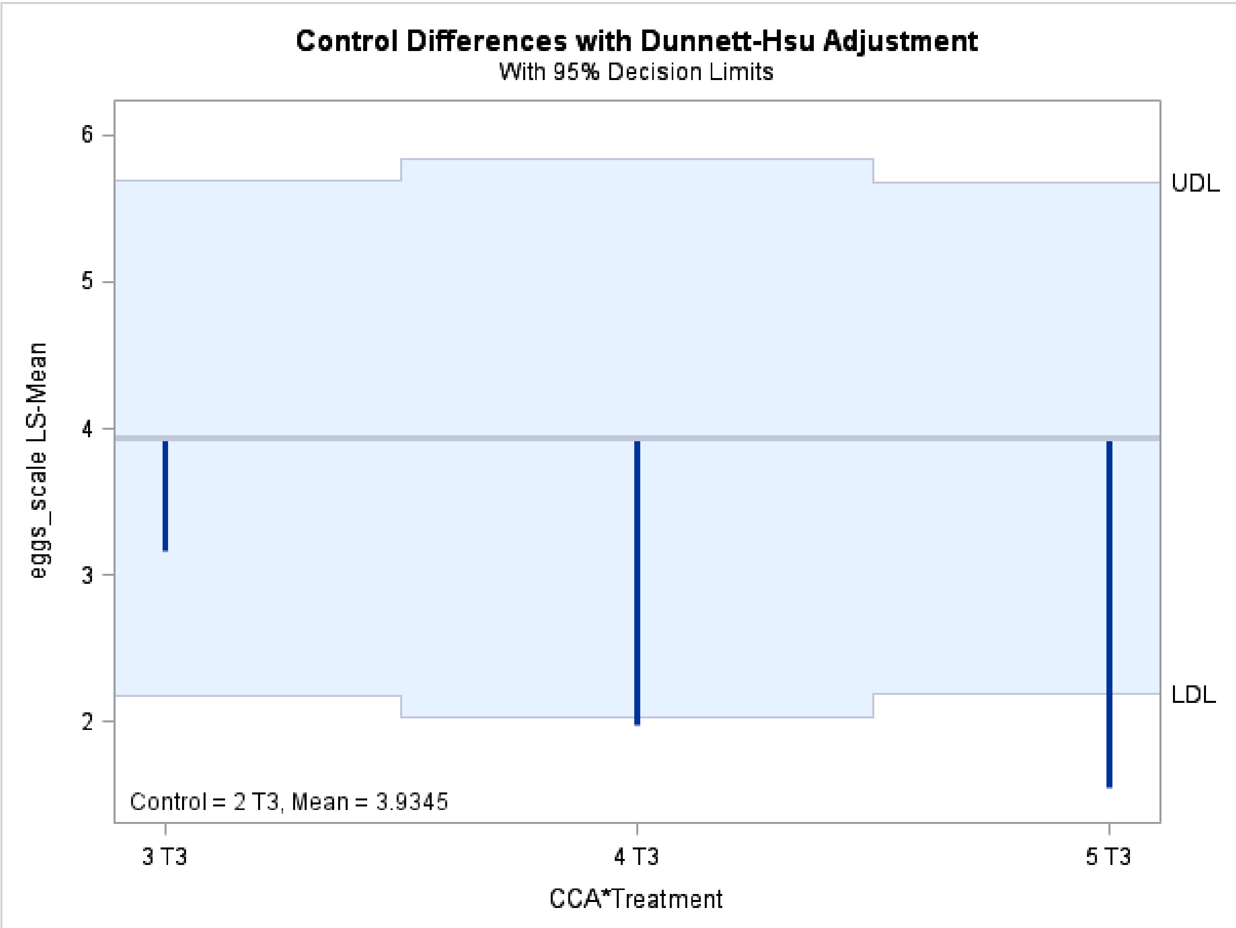


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	41.35	4.45	0.0085

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-0.7740	0.7290	49.47	-1.06	0.2935	0.5808
Treatment T3	**4**	**2**	-1.9565	0.7881	50.49	-2.48	0.0164	0.0427
Treatment T3	**5**	**2**	-2.3865	0.7224	45.56	-3.30	0.0019	0.0048



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	4.1710	0.5904	27.1	7.07	<.0001	0.05	2.9598	5.3822
CCA*Treatment	**T1**	**2**	4.2785	0.5904	27.1	7.25	<.0001	0.05	3.0673	5.4897
CCA*Treatment	**T2**	**2**	4.4935	0.5904	27.1	7.61	<.0001	0.05	3.2823	5.7047
CCA*Treatment	**T3**	**2**	3.9345	0.5904	27.1	6.66	<.0001	0.05	2.7233	5.1457
CCA*Treatment	**Control**	**3**	1.8275	0.5505	21.3	3.32	0.0032	0.05	0.6836	2.9714
CCA*Treatment	**T1**	**3**	3.3787	0.5837	22.3	5.79	<.0001	0.05	2.1692	4.5882
CCA*Treatment	**T2**	**3**	3.3540	0.5505	21.3	6.09	<.0001	0.05	2.2101	4.4979
CCA*Treatment	**T3**	**3**	3.1605	0.5505	21.3	5.74	<.0001	0.05	2.0166	4.3044

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**4**	3.2465	0.6313	25.9	5.14	<.0001	0.05	1.9486	4.5444
CCA*Treatment	**T1**	**4**	3.1830	0.6706	26.6	4.75	<.0001	0.05	1.8060	4.5601
CCA*Treatment	**T2**	**4**	2.6660	0.6313	25.9	4.22	0.0003	0.05	1.3681	3.9639
CCA*Treatment	**T3**	**4**	1.9780	0.6313	25.9	3.13	0.0043	0.05	0.6801	3.2759
CCA*Treatment	**Control**	**5**	4.1058	0.5733	25.7	7.16	<.0001	0.05	2.9266	5.2851
CCA*Treatment	**T1**	**5**	4.0912	0.5736	25.7	7.13	<.0001	0.05	2.9114	5.2709
CCA*Treatment	**T2**	**5**	2.6015	0.5412	24.6	4.81	<.0001	0.05	1.4861	3.7169
CCA*Treatment	**T3**	**5**	1.5480	0.5412	24.6	2.86	0.0085	0.05	0.4326	2.6634
CCA*Treatment	**Control**	**6**	1.4783	0.3453	9.05	4.28	0.0020	0.05	0.6979	2.2587
CCA*Treatment	**T1**	**6**	1.3960	0.4290	13.3	3.25	0.0061	0.05	0.4712	2.3208
CCA*Treatment	**T2**	**6**	1.0972	0.3451	9.04	3.18	0.0111	0.05	0.3170	1.8774

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - open_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	open_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations

Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	537.04780511	
1	2	522.03658249	0.00008781
2	1	522.02325238	0.00000014
3	1	522.02323145	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		0
Var(1)	**Treatme*hive(Apiary)**	3.4066
Var(2)	**Treatme*hive(Apiary)**	4.0627
Var(3)	**Treatme*hive(Apiary)**	2.7005
Var(4)	**Treatme*hive(Apiary)**	4.6849
Var(5)	**Treatme*hive(Apiary)**	0.8952
CSH	**Treatme*hive(Apiary)**	0.1168

Fit Statistics

-2 Res Log Likelihood	522.0
AIC (Smaller is Better)	534.0
AICC (Smaller is Better)	534.7
BIC (Smaller is Better)	530.3

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	29.1	5.99	0.0026
CCA	4	51.3	58.90	<.0001

Type 3 Tests of Fixed Effects

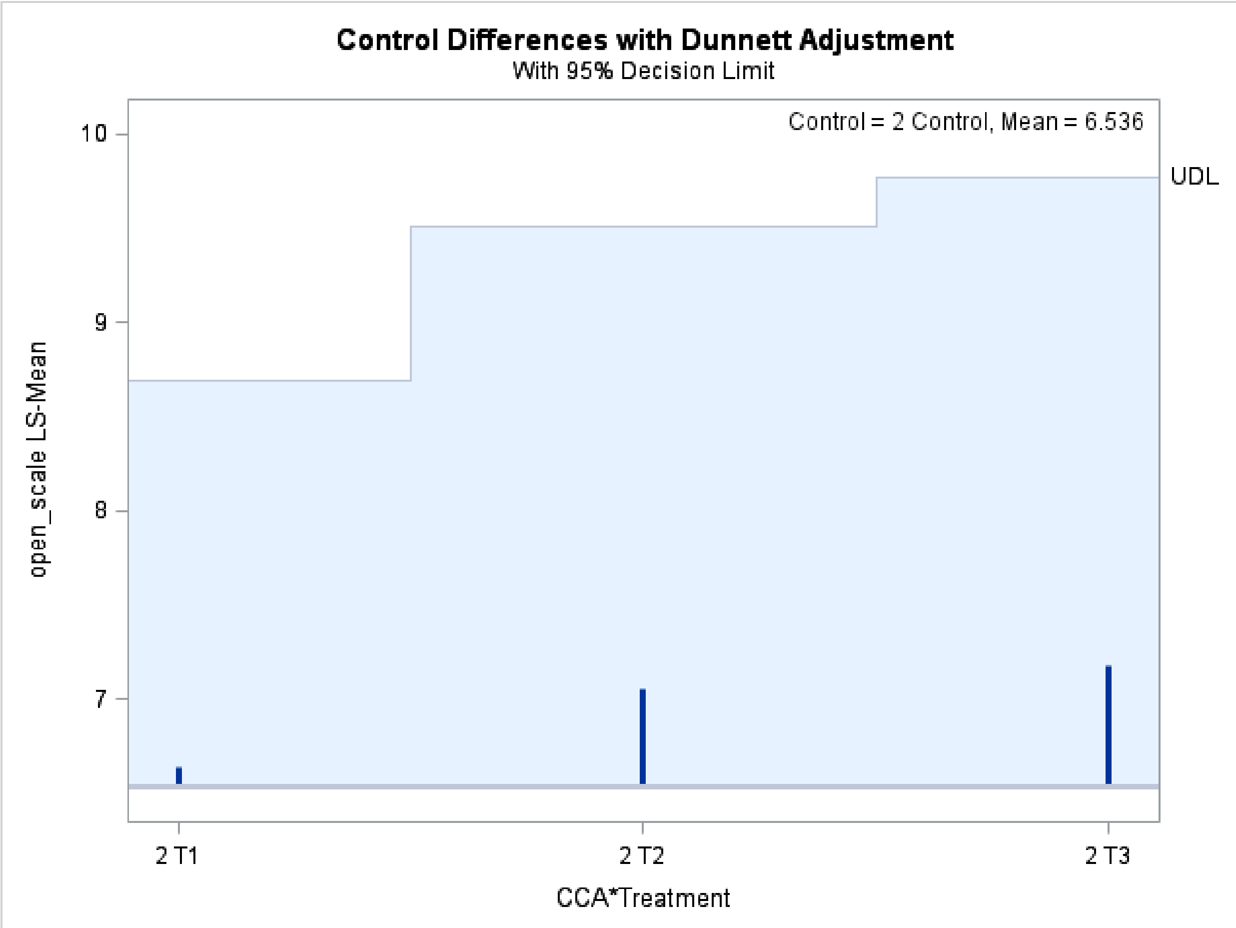
Effect	Num DF	Den DF	F Value	Pr > F
CCA*Treatment	11	53	2.10	0.0366

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	27.93	0.23	0.8759

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	**Control**	**T1**	-0.1075	0.9228	27.93	-0.12	0.5460	0.7903
CCA 2	**Control**	**T2**	-0.5160	0.9228	27.93	-0.56	0.7097	0.9052
CCA 2	**Control**	**T3**	-0.6450	0.9228	27.93	-0.70	0.7548	0.9293

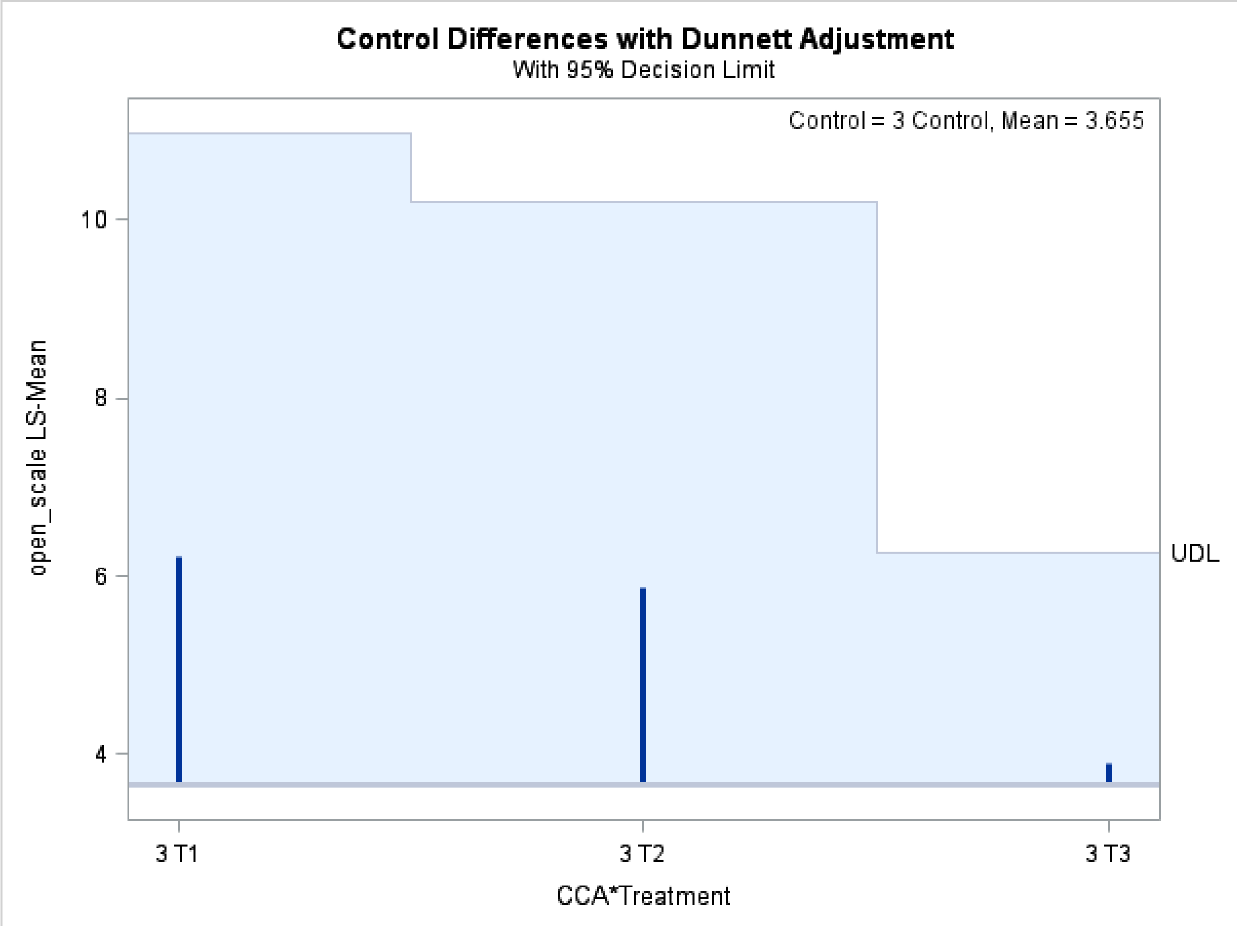


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	27.06	3.29	0.0356

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	-2.5596	1.0427	27.08	-2.45	0.9896	0.9997
CCA 3	**Control**	**T2**	-2.2145	1.0078	27.05	-2.20	0.9816	0.9992
CCA 3	**Control**	**T3**	-0.2365	1.0078	27.05	-0.23	0.5919	0.8297

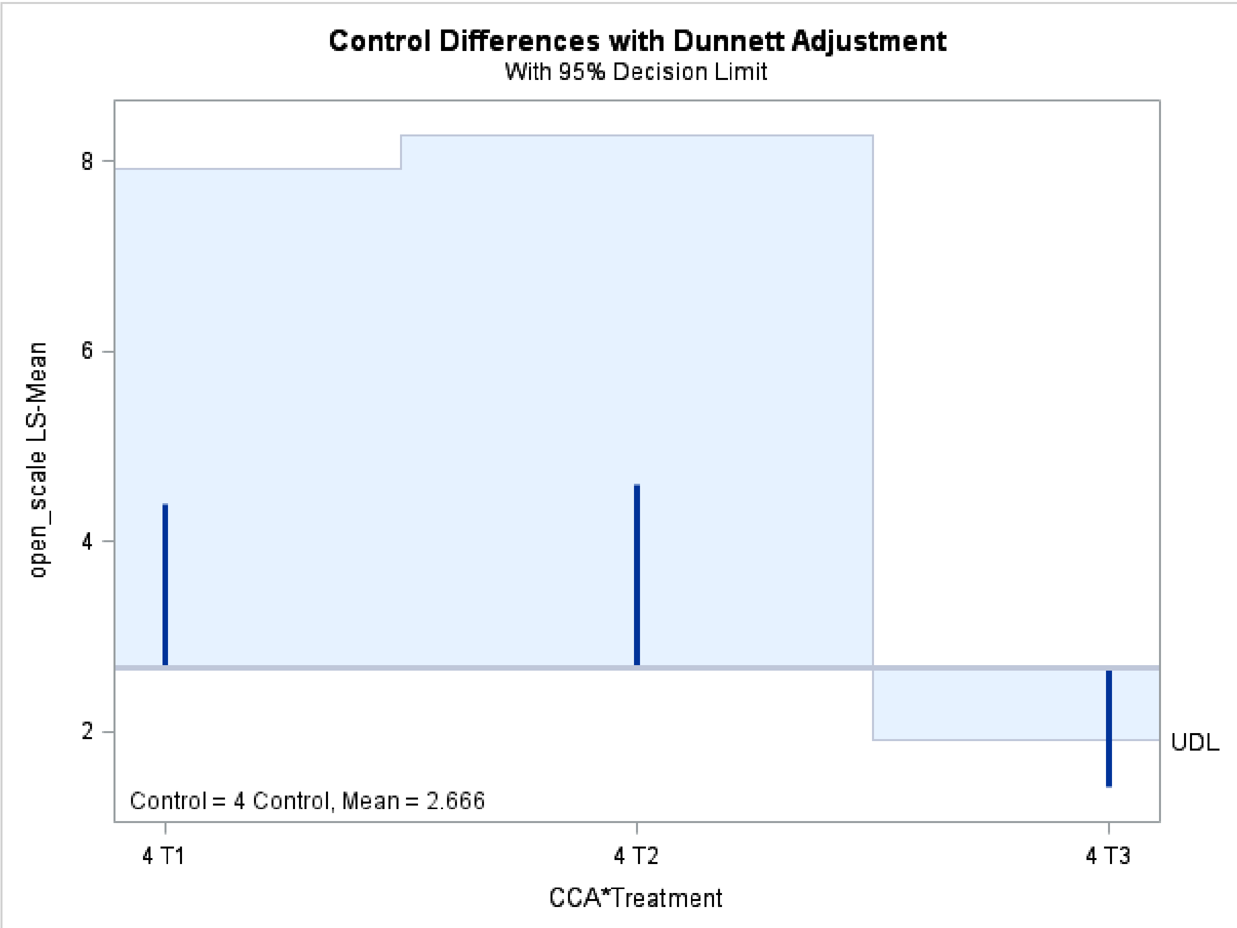


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	27.42	6.59	0.0017

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	-1.7307	0.8501	27.43	-2.04	0.9742	0.9985
CCA 4	**Control**	**T2**	-1.9350	0.8217	27.4	-2.35	0.9870	0.9995
CCA 4	**Control**	**T3**	1.2470	0.8217	27.4	1.52	0.0703	0.1549

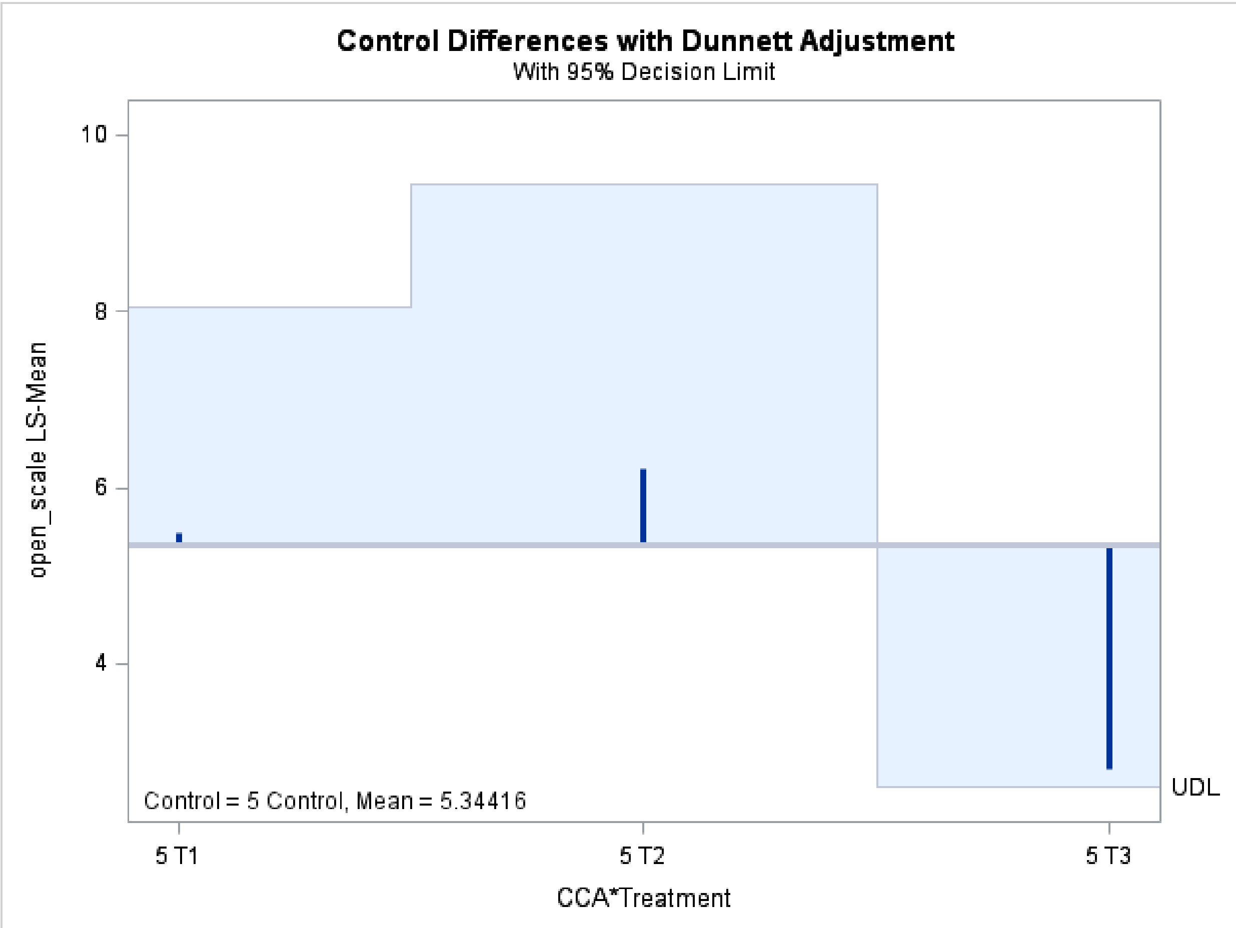


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	27.03	3.77	0.0222

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	-0.1332	1.1553	27.04	-0.12	0.5455	0.7842
CCA 5	**Control**	**T2**	-0.8693	1.1190	27.04	-0.78	0.7780	0.9375
CCA 5	**Control**	**T3**	2.5492	1.1190	27.04	2.28	0.0154	0.0342

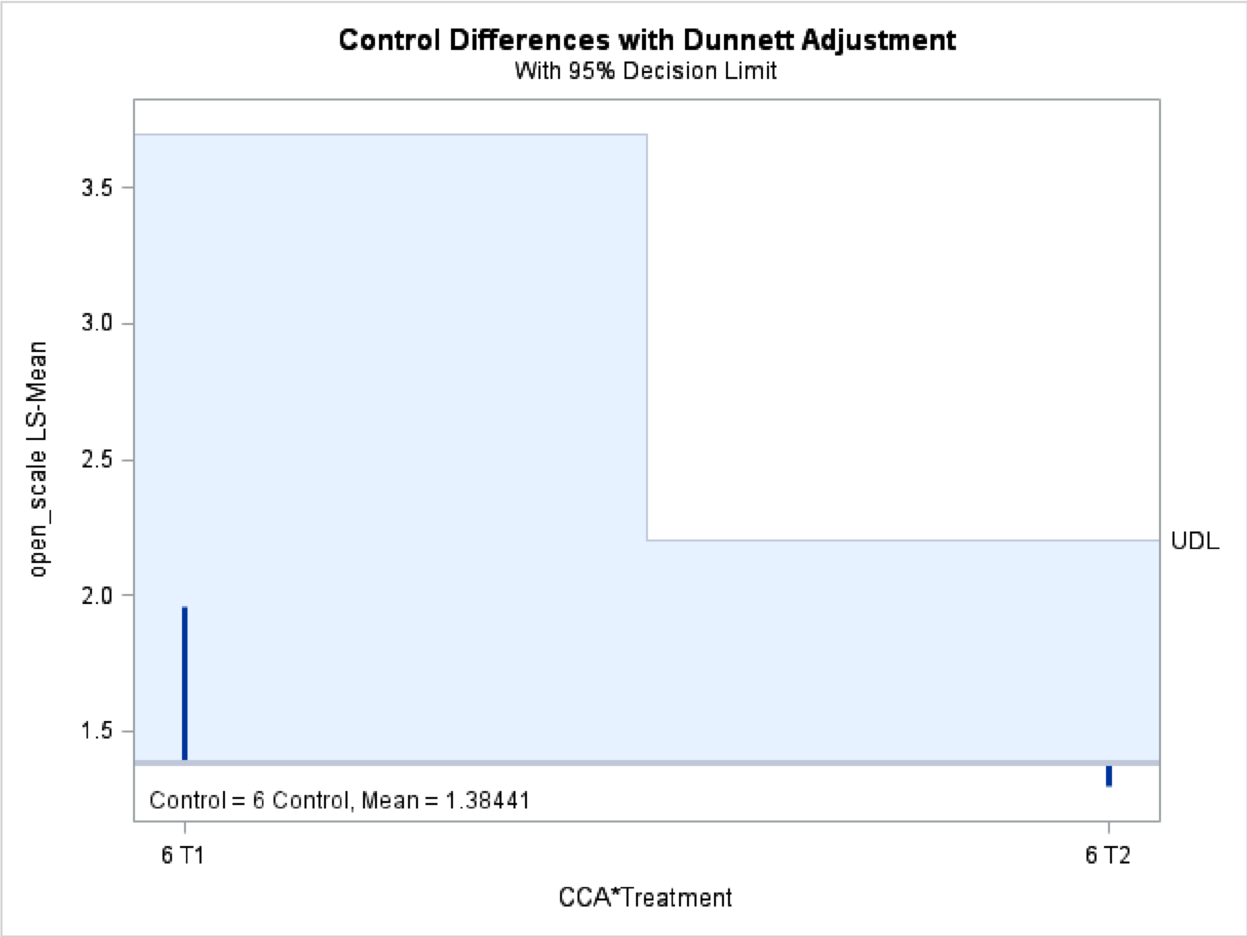


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	14.75	0.69	0.5157

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	-0.5767	0.5891	14.79	-0.98	0.8283	0.9396
CCA 6	**Control**	**T2**	0.08638	0.5046	14.68	0.17	0.4332	0.6090

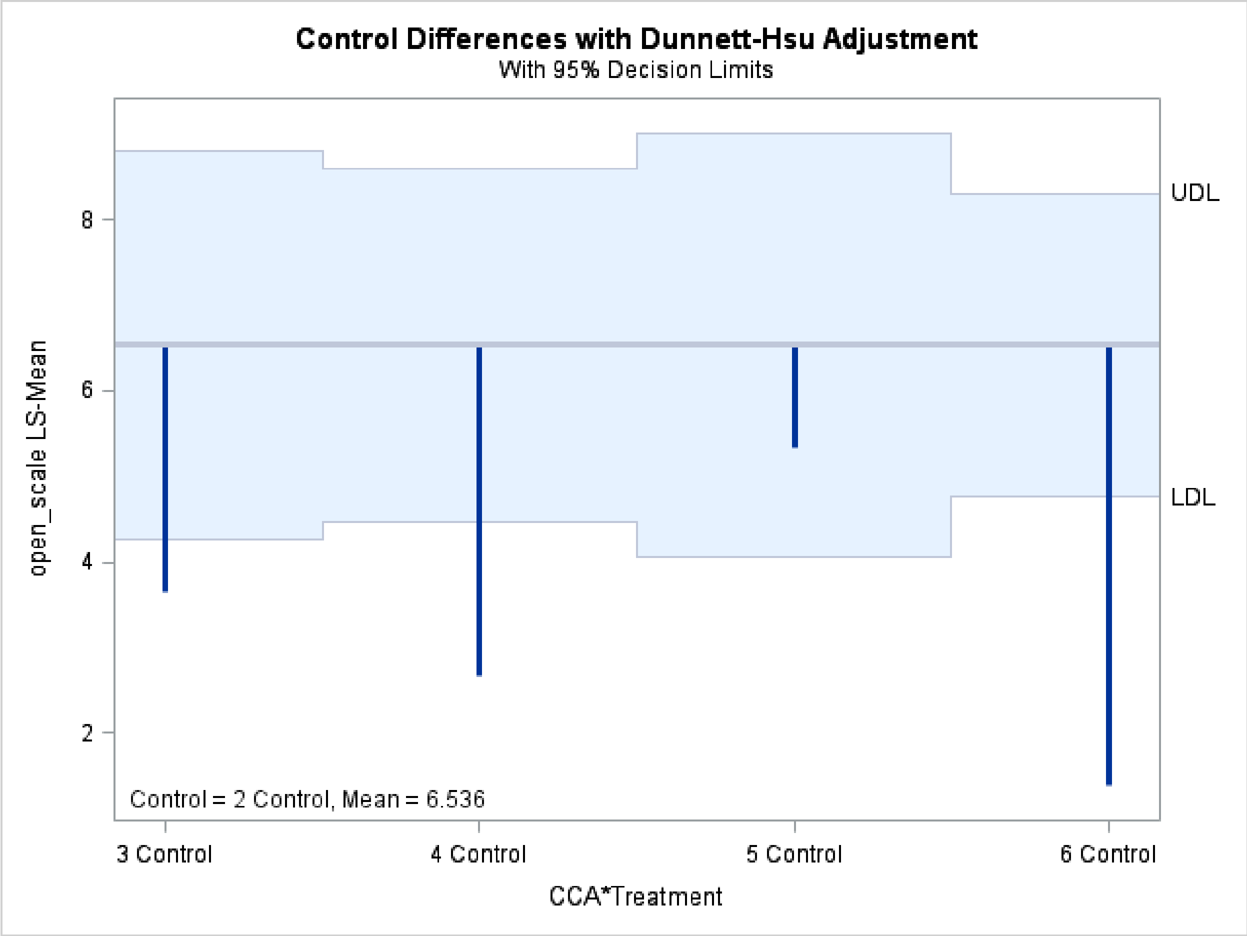


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	48.54	16.03	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	-2.8810	0.9083	49.39	-3.17	0.0026	0.0089
Treatment Control	**4**	**2**	-3.8700	0.8215	49.18	-4.71	<.0001	<.0001
Treatment Control	**5**	**2**	-1.1918	0.9878	45.18	-1.21	0.2339	0.5563
Treatment Control	**6**	**2**	-5.1516	0.7086	38.93	-7.27	<.0001	<.0001

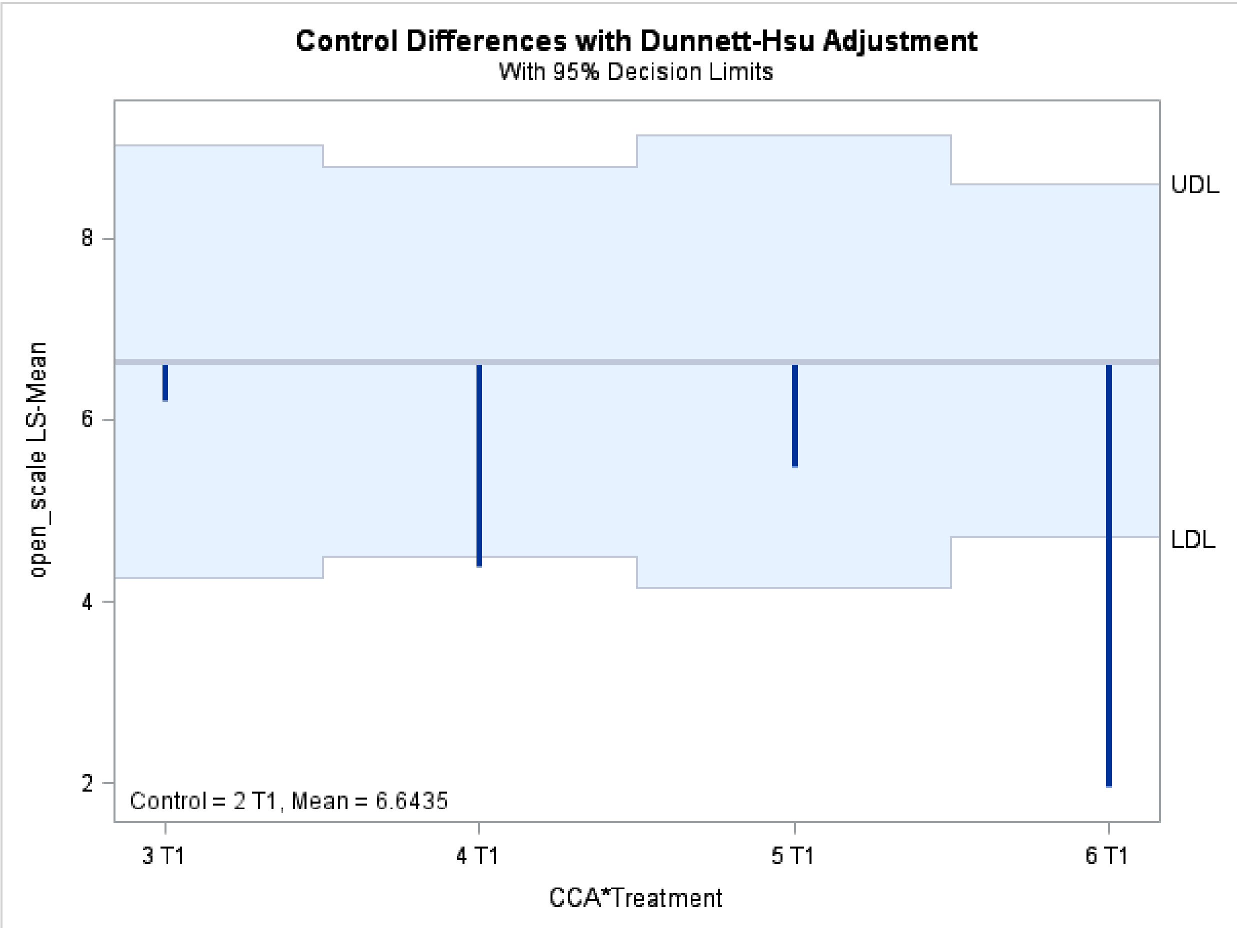


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	47.63	12.21	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	-0.4289	0.9469	49.28	-0.45	0.6526	0.9749
Treatment T1	**4**	**2**	-2.2468	0.8499	50.41	-2.64	0.0109	0.0369
Treatment T1	**5**	**2**	-1.1662	0.9886	45.47	-1.18	0.2443	0.5887
Treatment T1	**6**	**2**	-4.6824	0.7711	42.74	-6.07	<.0001	<.0001

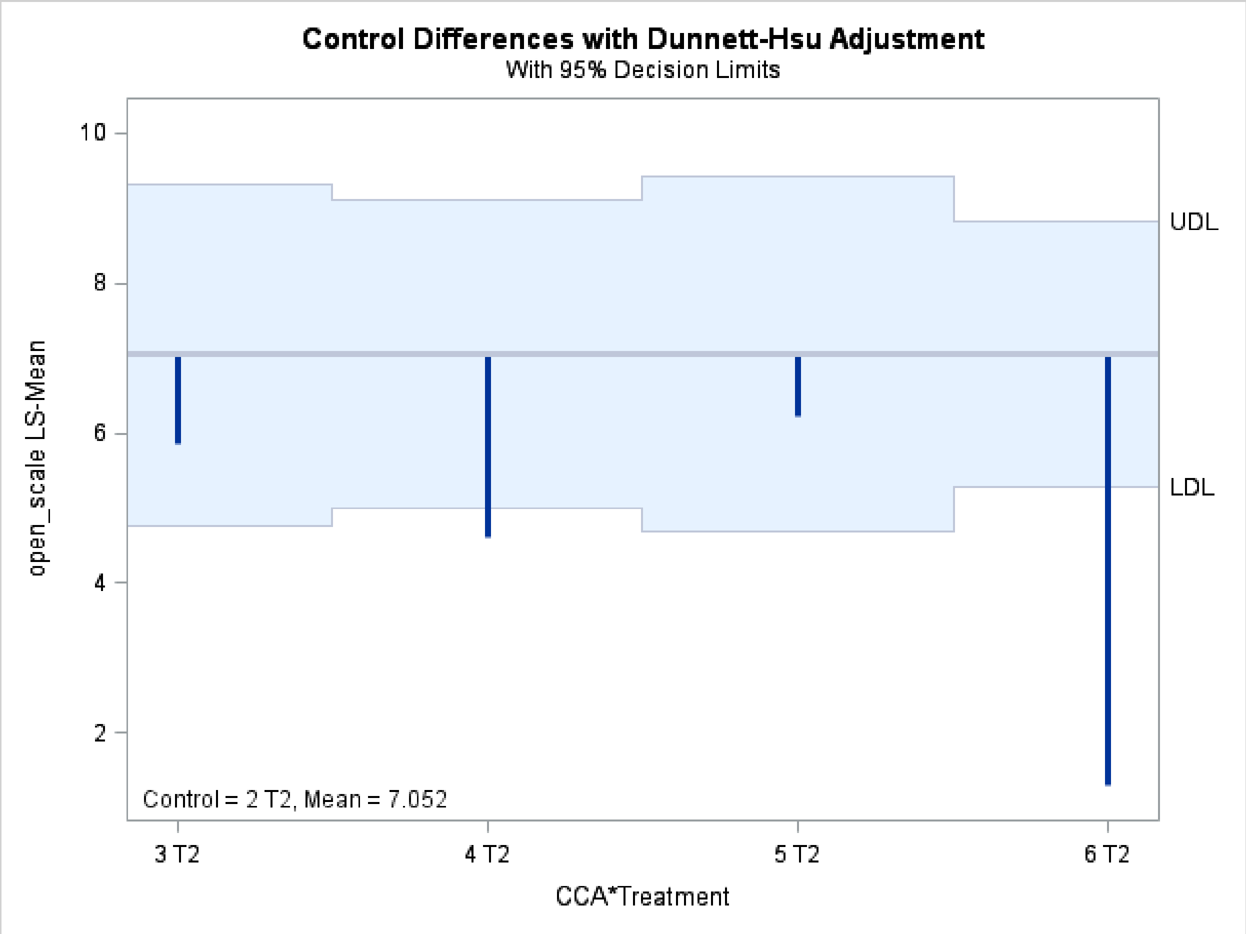


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	49.28	24.96	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	-1.1825	0.9083	49.39	-1.30	0.1990	0.4890
Treatment T2	**4**	**2**	-2.4510	0.8215	49.18	-2.98	0.0044	0.0149
Treatment T2	**5**	**2**	-0.8385	0.9459	45.89	-0.89	0.3800	0.7746
Treatment T2	**6**	**2**	-5.7540	0.7086	38.91	-8.12	<.0001	<.0001

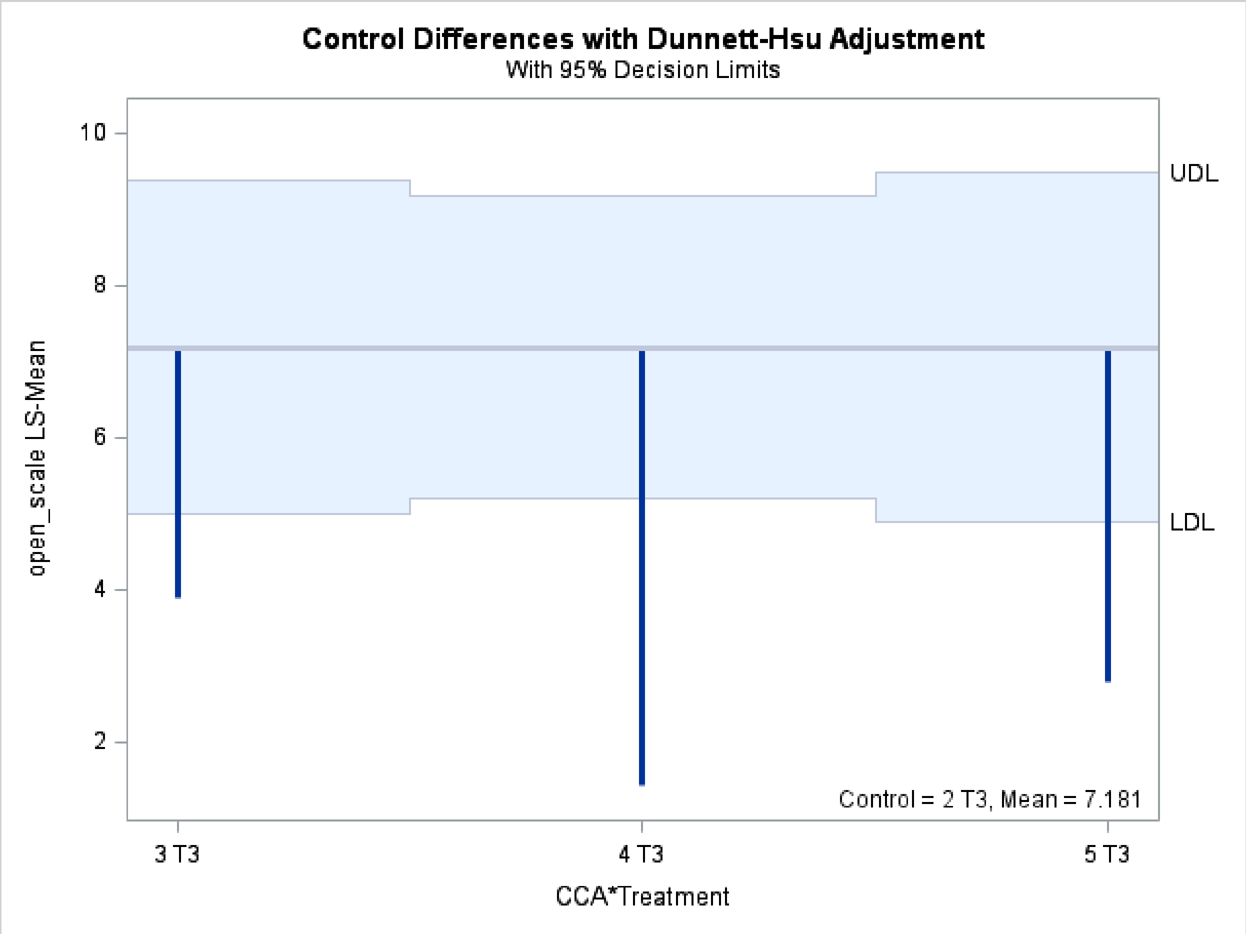


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	48.86	17.10	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-3.2895	0.9083	49.39	-3.62	0.0007	0.0019
Treatment T3	**4**	**2**	-5.7620	0.8215	49.18	-7.01	<.0001	<.0001
Treatment T3	**5**	**2**	-4.3860	0.9459	45.89	-4.64	<.0001	<.0001



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	6.5360	0.6525	27.9	10.02	<.0001	0.05	5.1992	7.8728
CCA*Treatment	**T1**	**2**	6.6435	0.6525	27.9	10.18	<.0001	0.05	5.3067	7.9803
CCA*Treatment	**T2**	**2**	7.0520	0.6525	27.9	10.81	<.0001	0.05	5.7152	8.3888
CCA*Treatment	**T3**	**2**	7.1810	0.6525	27.9	11.00	<.0001	0.05	5.8442	8.5178
CCA*Treatment	**Control**	**3**	3.6550	0.7126	27	5.13	<.0001	0.05	2.1929	5.1171
CCA*Treatment	**T1**	**3**	6.2146	0.7612	27.1	8.16	<.0001	0.05	4.6531	7.7762
CCA*Treatment	**T2**	**3**	5.8695	0.7126	27	8.24	<.0001	0.05	4.4074	7.3316
CCA*Treatment	**T3**	**3**	3.8915	0.7126	27	5.46	<.0001	0.05	2.4294	5.3536

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**4**	2.6660	0.5810	27.4	4.59	<.0001	0.05	1.4747	3.8573
CCA*Treatment	**T1**	**4**	4.3967	0.6206	27.4	7.08	<.0001	0.05	3.1243	5.6691
CCA*Treatment	**T2**	**4**	4.6010	0.5810	27.4	7.92	<.0001	0.05	3.4097	5.7923
CCA*Treatment	**T3**	**4**	1.4190	0.5810	27.4	2.44	0.0213	0.05	0.2277	2.6103
CCA*Treatment	**Control**	**5**	5.3442	0.8164	27	6.55	<.0001	0.05	3.6692	7.0191
CCA*Treatment	**T1**	**5**	5.4773	0.8174	27	6.70	<.0001	0.05	3.8003	7.1544
CCA*Treatment	**T2**	**5**	6.2135	0.7653	27	8.12	<.0001	0.05	4.6434	7.7836
CCA*Treatment	**T3**	**5**	2.7950	0.7653	27	3.65	0.0011	0.05	1.2249	4.3651
CCA*Treatment	**Control**	**6**	1.3844	0.3569	14.7	3.88	0.0015	0.05	0.6223	2.1465
CCA*Treatment	**T1**	**6**	1.9611	0.4687	14.8	4.18	0.0008	0.05	0.9611	2.9611
CCA*Treatment	**T2**	**6**	1.2980	0.3567	14.7	3.64	0.0025	0.05	0.5363	2.0597

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - capped_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	capped_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations

Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	689.04467969	
1	2	680.67561166	0.00006763
2	1	680.65971709	0.00000021
3	1	680.65966983	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		0
Var(1)	**Treatme*hive(Apiary)**	14.9067
Var(2)	**Treatme*hive(Apiary)**	9.4352
Var(3)	**Treatme*hive(Apiary)**	12.2559
Var(4)	**Treatme*hive(Apiary)**	12.9584
Var(5)	**Treatme*hive(Apiary)**	7.0195
CSH	**Treatme*hive(Apiary)**	0.1885

Fit Statistics

-2 Res Log Likelihood	680.7
AIC (Smaller is Better)	692.7
AICC (Smaller is Better)	693.4
BIC (Smaller is Better)	689.0

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	26.5	7.58	0.0008
CCA	4	42.2	34.68	<.0001

Type 3 Tests of Fixed Effects

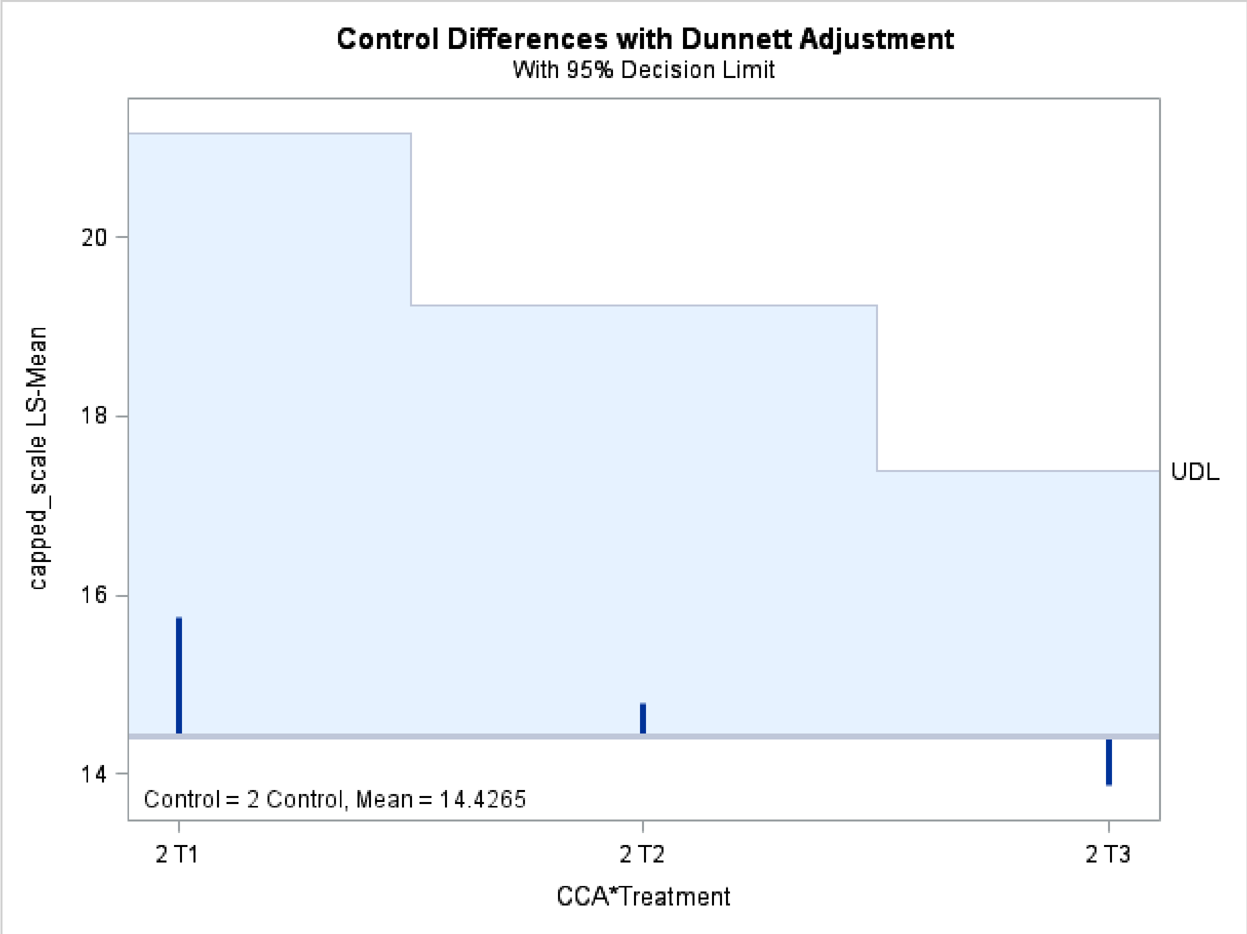
Effect	Num DF	Den DF	F Value	Pr > F
CCA*Treatment	11	51.4	2.49	0.0137

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	24.89	0.34	0.7969

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	**Control**	**T1**	-1.3330	1.9305	24.89	-0.69	0.7519	0.9280
CCA 2	**Control**	**T2**	-0.3655	1.9305	24.89	-0.19	0.5743	0.8134
CCA 2	**Control**	**T3**	0.5590	1.9305	24.89	0.29	0.3873	0.6350

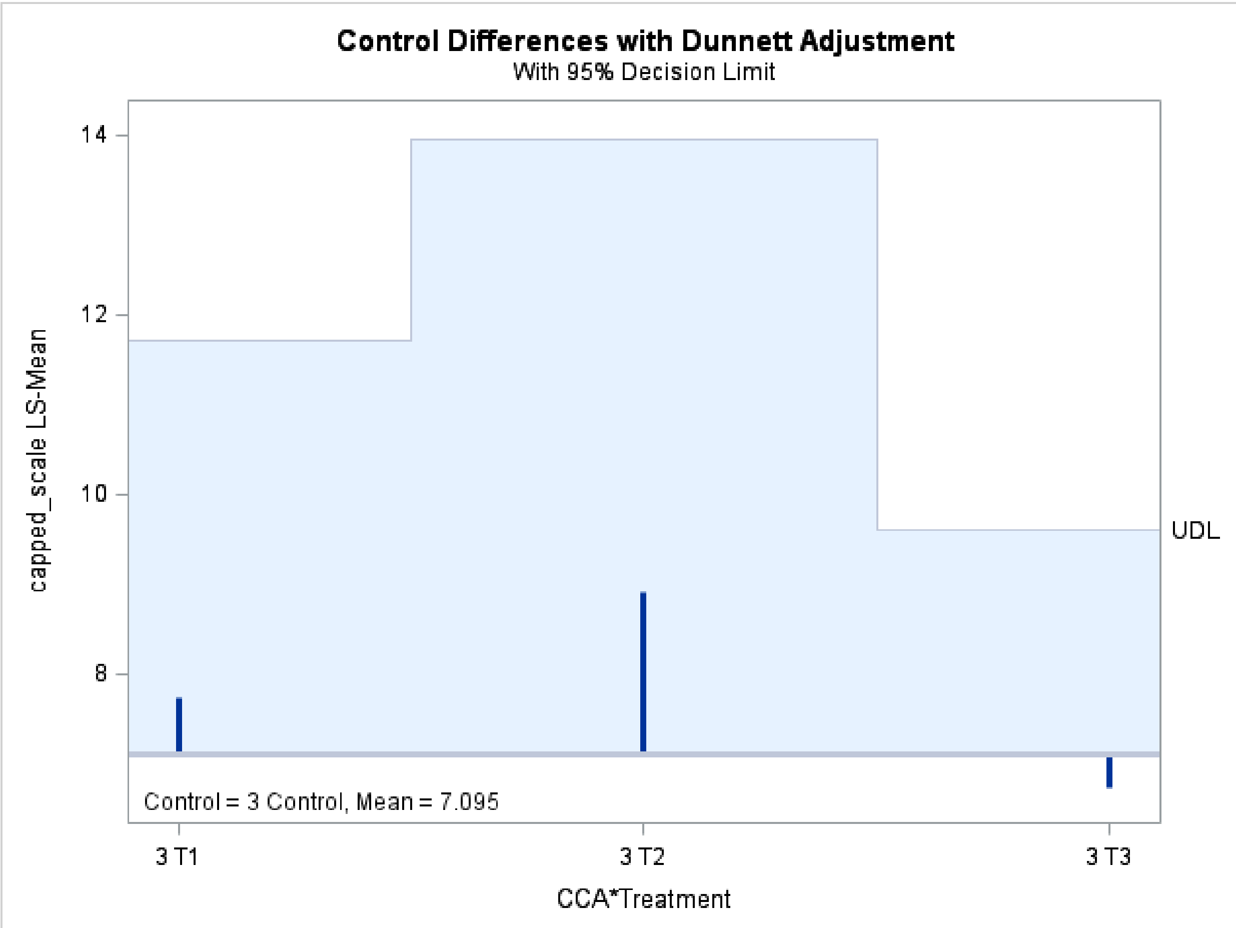


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	26.75	0.77	0.5218

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	-0.6316	1.5879	26.79	-0.40	0.6530	0.8727
CCA 3	**Control**	**T2**	-1.8060	1.5358	26.7	-1.18	0.8750	0.9784
CCA 3	**Control**	**T3**	0.3655	1.5358	26.7	0.24	0.4069	0.6599

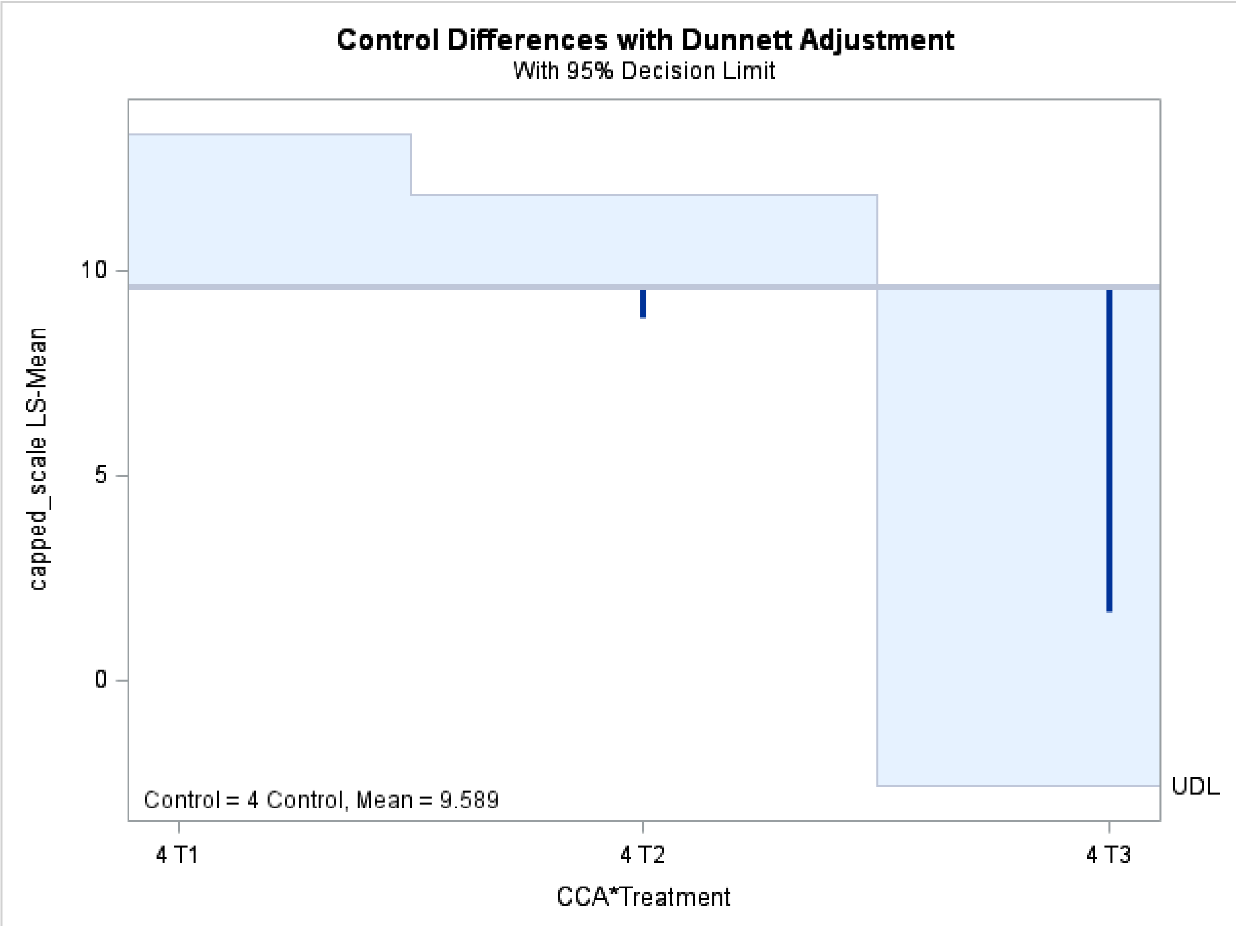


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	28.63	9.56	0.0002

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	0.04996	1.8097	28.65	0.03	0.4891	0.7429
CCA 4	**Control**	**T2**	0.7310	1.7504	28.6	0.42	0.3397	0.5822
CCA 4	**Control**	**T3**	7.9335	1.7504	28.6	4.53	<.0001	<.0001

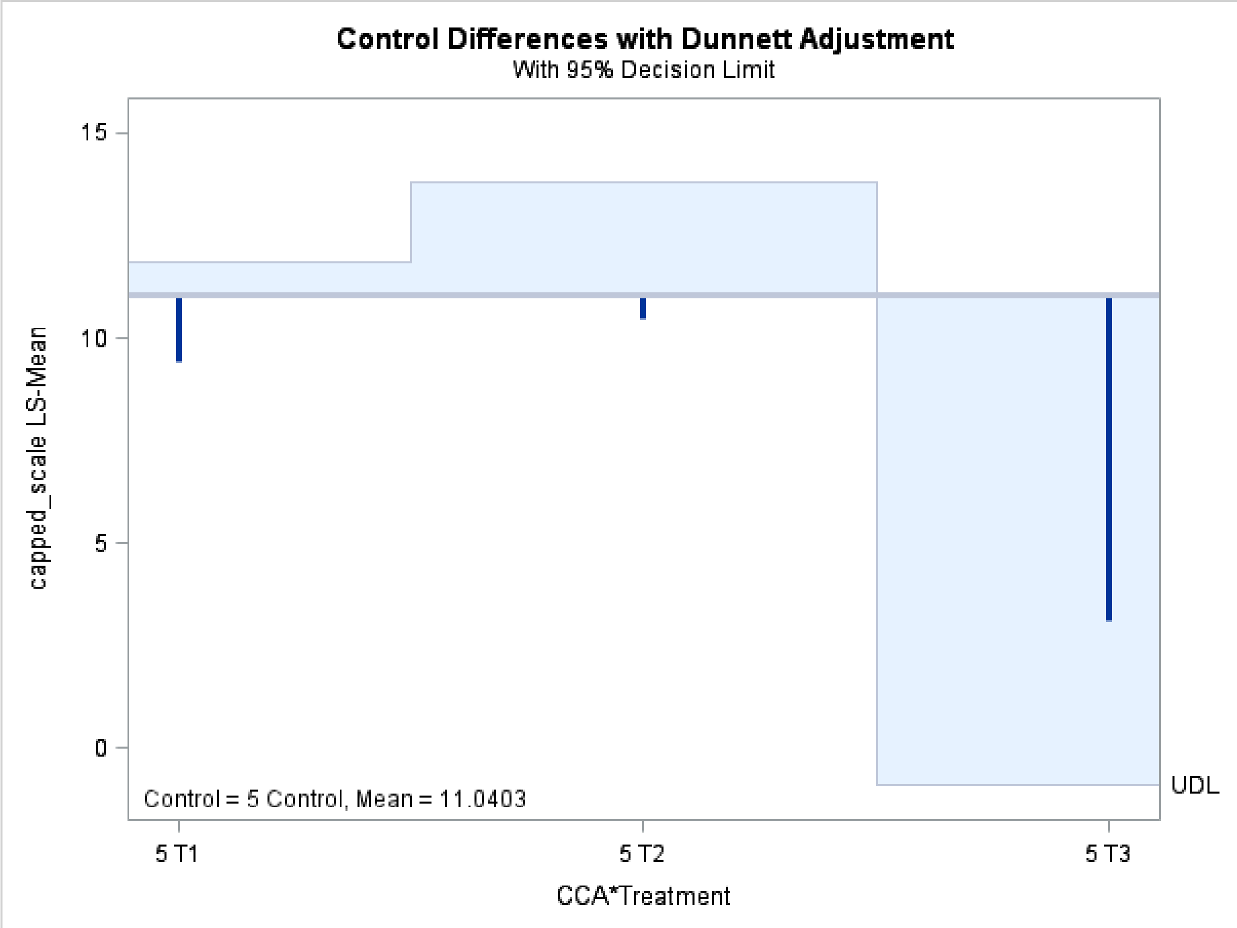


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	27.3	8.08	0.0005

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	1.6198	1.9174	27.38	0.84	0.2028	0.3851
CCA 5	**Control**	**T2**	0.5698	1.8582	27.33	0.31	0.3807	0.6219
CCA 5	**Control**	**T3**	7.9228	1.8582	27.33	4.26	0.0001	0.0001

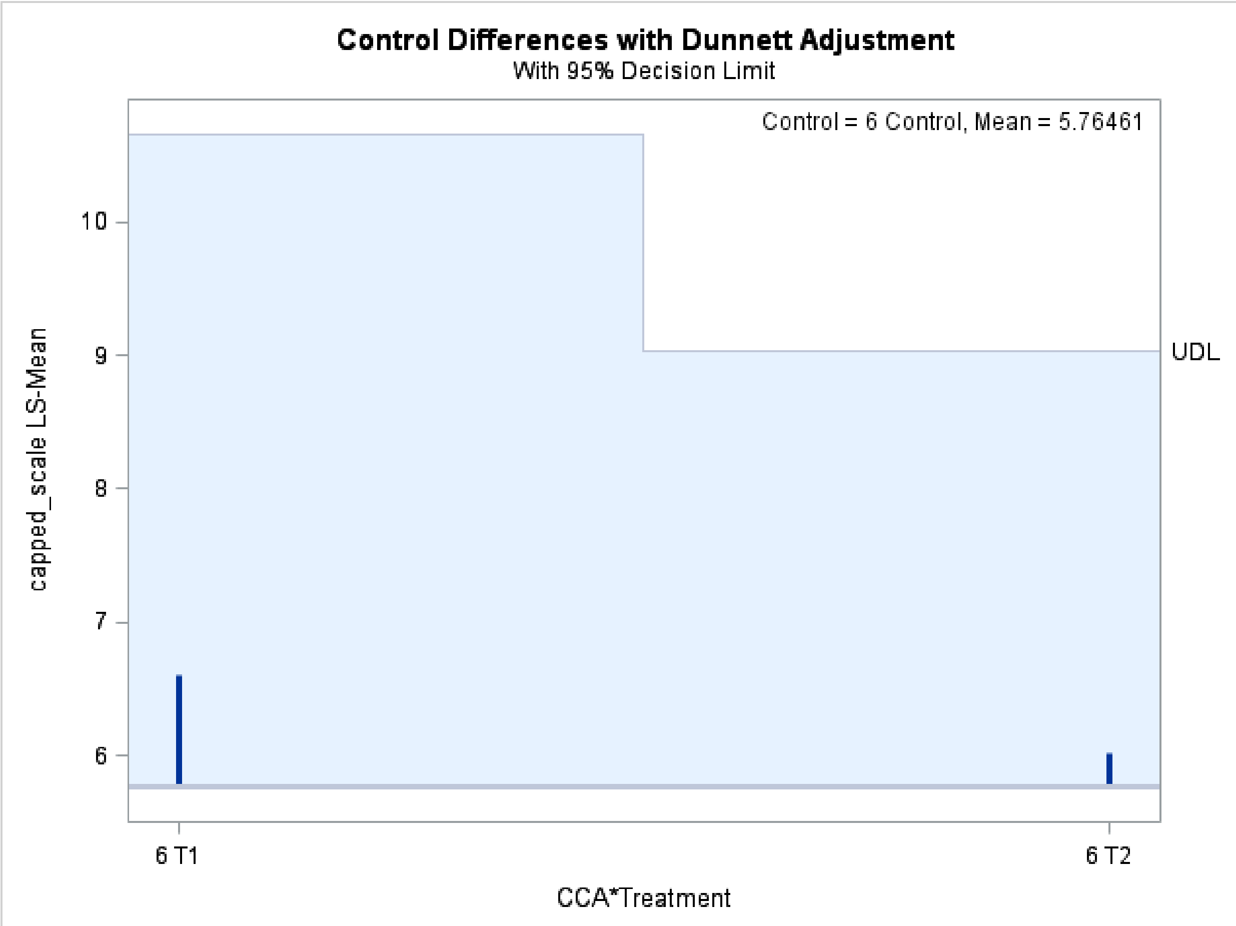


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	16.56	0.13	0.8772

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	-0.8368	1.6356	16.55	-0.51	0.6922	0.8492
CCA 6	**Control**	**T2**	-0.2481	1.4087	16.56	-0.18	0.5688	0.7455

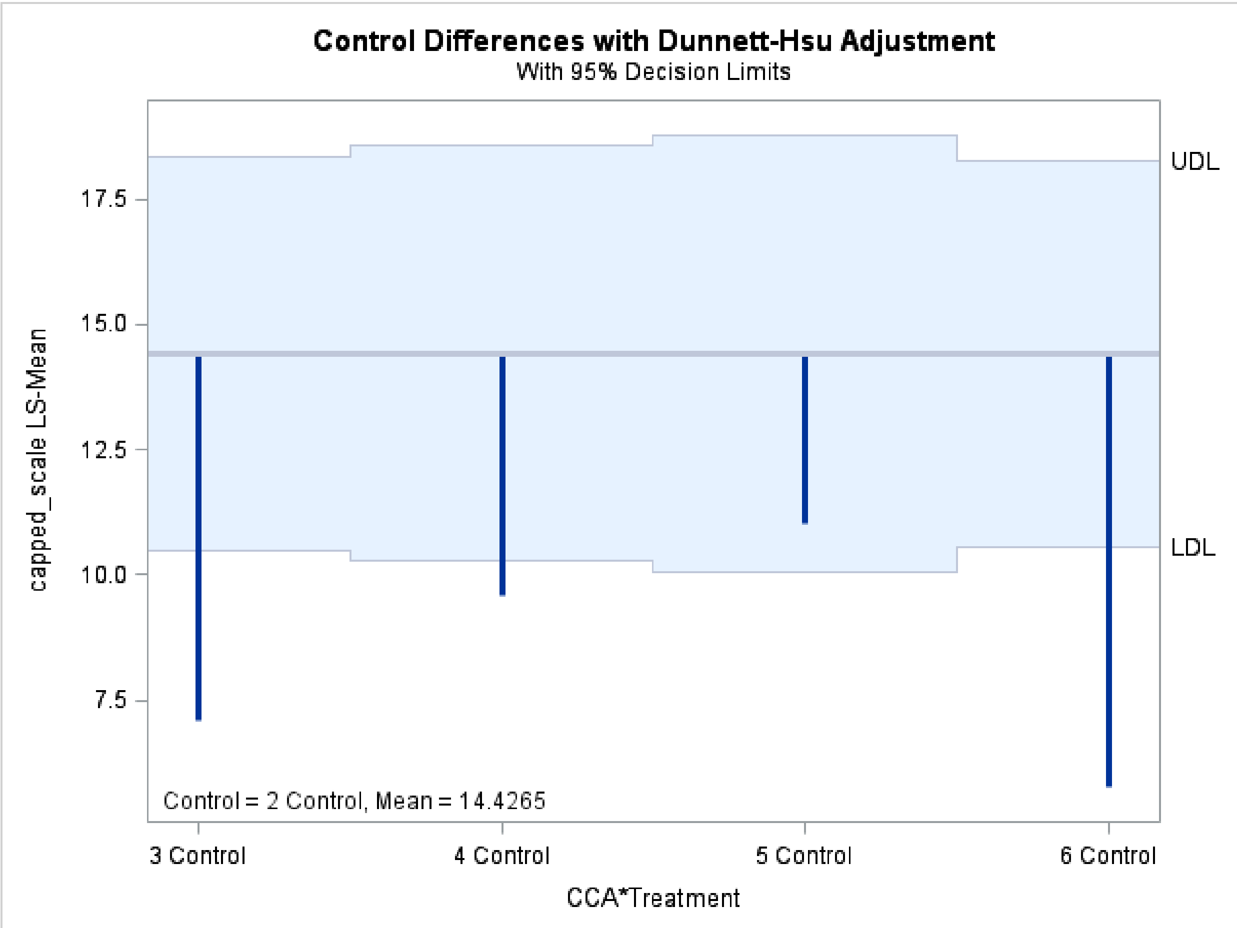


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	40.55	9.59	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	-7.3315	1.5760	49.75	-4.65	<.0001	<.0001
Treatment Control	**4**	**2**	-4.8375	1.6608	51.35	-2.91	0.0053	0.0178
Treatment Control	**5**	**2**	-3.3862	1.7441	51.45	-1.94	0.0577	0.1648
Treatment Control	**6**	**2**	-8.6619	1.5409	41.58	-5.62	<.0001	<.0001

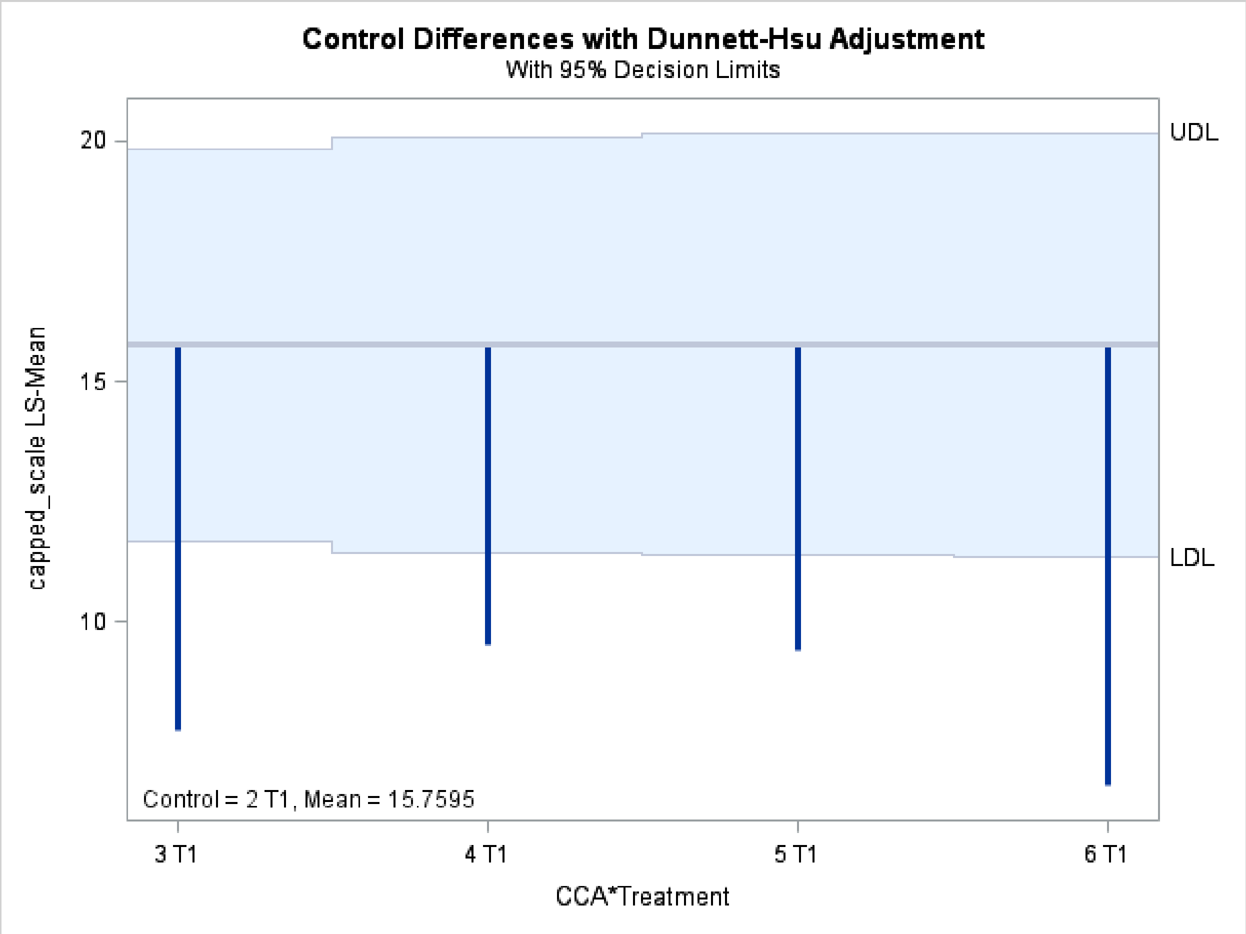


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	41.25	8.40	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	-8.0329	1.6268	51.85	-4.94	<.0001	<.0001
Treatment T1	**4**	**2**	-6.2205	1.7232	52.63	-3.61	0.0007	0.0026
Treatment T1	**5**	**2**	-6.3390	1.7468	51.81	-3.63	0.0007	0.0024
Treatment T1	**6**	**2**	-9.1581	1.7503	40.37	-5.23	<.0001	<.0001

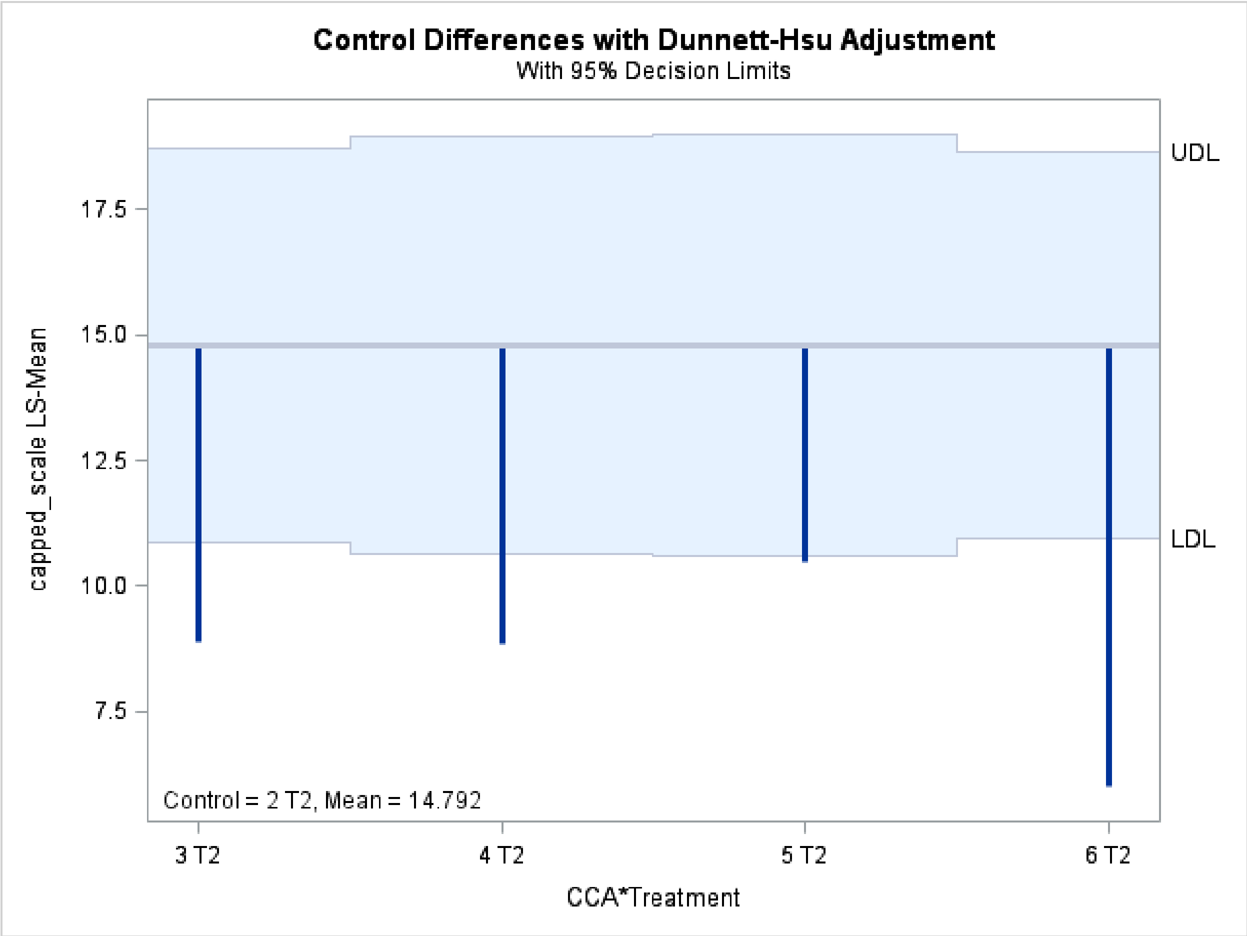


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	42.41	8.46	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	-5.8910	1.5760	49.75	-3.74	0.0005	0.0017
Treatment T2	**4**	**2**	-5.9340	1.6608	51.35	-3.57	0.0008	0.0028
Treatment T2	**5**	**2**	-4.3215	1.6817	50.93	-2.57	0.0131	0.0418
Treatment T2	**6**	**2**	-8.7793	1.5404	41.54	-5.70	<.0001	<.0001

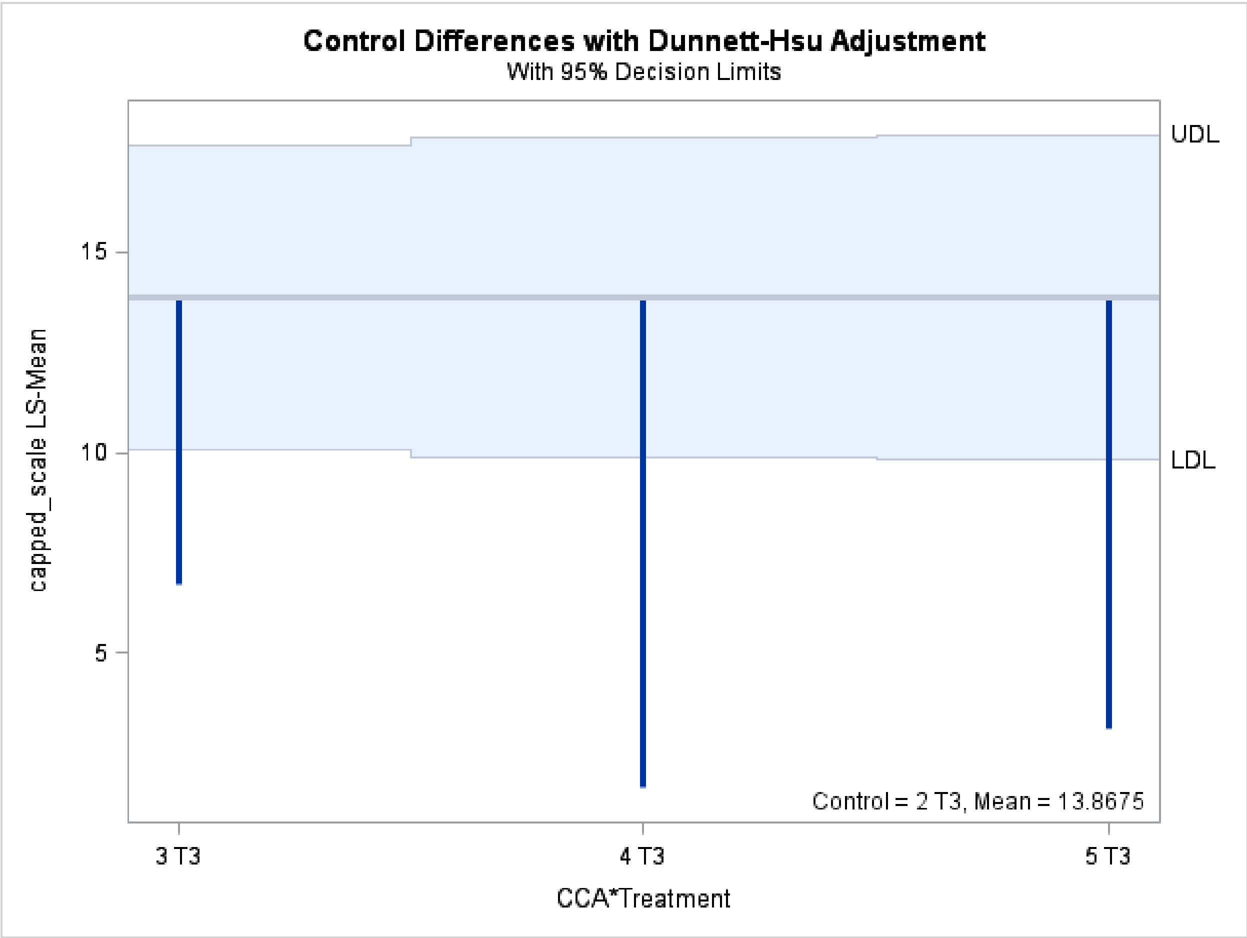


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	45.38	20.98	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-7.1380	1.5760	49.75	-4.53	<.0001	0.0001
Treatment T3	**4**	**2**	-12.2120	1.6608	51.35	-7.35	<.0001	<.0001
Treatment T3	**5**	**2**	-10.7500	1.6817	50.93	-6.39	<.0001	<.0001



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	14.4265	1.3650	24.9	10.57	<.0001	0.05	11.6145	17.2385
CCA*Treatment	**T1**	**2**	15.7595	1.3650	24.9	11.55	<.0001	0.05	12.9475	18.5715
CCA*Treatment	**T2**	**2**	14.7920	1.3650	24.9	10.84	<.0001	0.05	11.9800	17.6040
CCA*Treatment	**T3**	**2**	13.8675	1.3650	24.9	10.16	<.0001	0.05	11.0555	16.6795
CCA*Treatment	**Control**	**3**	7.0950	1.0860	26.7	6.53	<.0001	0.05	4.8655	9.3245
CCA*Treatment	**T1**	**3**	7.7266	1.1584	26.9	6.67	<.0001	0.05	5.3492	10.1040
CCA*Treatment	**T2**	**3**	8.9010	1.0860	26.7	8.20	<.0001	0.05	6.6715	11.1305
CCA*Treatment	**T3**	**3**	6.7295	1.0860	26.7	6.20	<.0001	0.05	4.5000	8.9590

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**4**	9.5890	1.2377	28.6	7.75	<.0001	0.05	7.0560	12.1220
CCA*Treatment	**T1**	**4**	9.5390	1.3203	28.7	7.23	<.0001	0.05	6.8375	12.2405
CCA*Treatment	**T2**	**4**	8.8580	1.2377	28.6	7.16	<.0001	0.05	6.3250	11.3910
CCA*Treatment	**T3**	**4**	1.6555	1.2377	28.6	1.34	0.1916	0.05	-0.8775	4.1885
CCA*Treatment	**Control**	**5**	11.0403	1.3540	27.4	8.15	<.0001	0.05	8.2641	13.8164
CCA*Treatment	**T1**	**5**	9.4205	1.3576	27.3	6.94	<.0001	0.05	6.6366	12.2044
CCA*Treatment	**T2**	**5**	10.4705	1.2727	27.2	8.23	<.0001	0.05	7.8601	13.0809
CCA*Treatment	**T3**	**5**	3.1175	1.2727	27.2	2.45	0.0210	0.05	0.5071	5.7279
CCA*Treatment	**Control**	**6**	5.7646	0.9965	16.6	5.78	<.0001	0.05	3.6578	7.8714
CCA*Treatment	**T1**	**6**	6.6014	1.2970	16.5	5.09	<.0001	0.05	3.8588	9.3441
CCA*Treatment	**T2**	**6**	6.0127	0.9957	16.6	6.04	<.0001	0.05	3.9077	8.1177

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - beebread_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	beebread_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations	
Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	589.47987502	
1	2	561.67265519	0.00252716
2	1	561.18849786	0.00020104
3	1	561.15191284	0.00000573
4	1	561.15092358	0.00000001
5	1	561.15092125	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		0.4531
Var(1)	Treatme*hive(Apiary)	9.7335
Var(2)	Treatme*hive(Apiary)	3.3201
Var(3)	Treatme*hive(Apiary)	2.5643
Var(4)	Treatme*hive(Apiary)	3.7795
Var(5)	Treatme*hive(Apiary)	5.0622
CSH	Treatme*hive(Apiary)	0.2446

Fit Statistics

-2 Res Log Likelihood	561.2
AIC (Smaller is Better)	575.2
AICC (Smaller is Better)	576.1
BIC (Smaller is Better)	570.9

Type 3 Tests of Fixed Effects

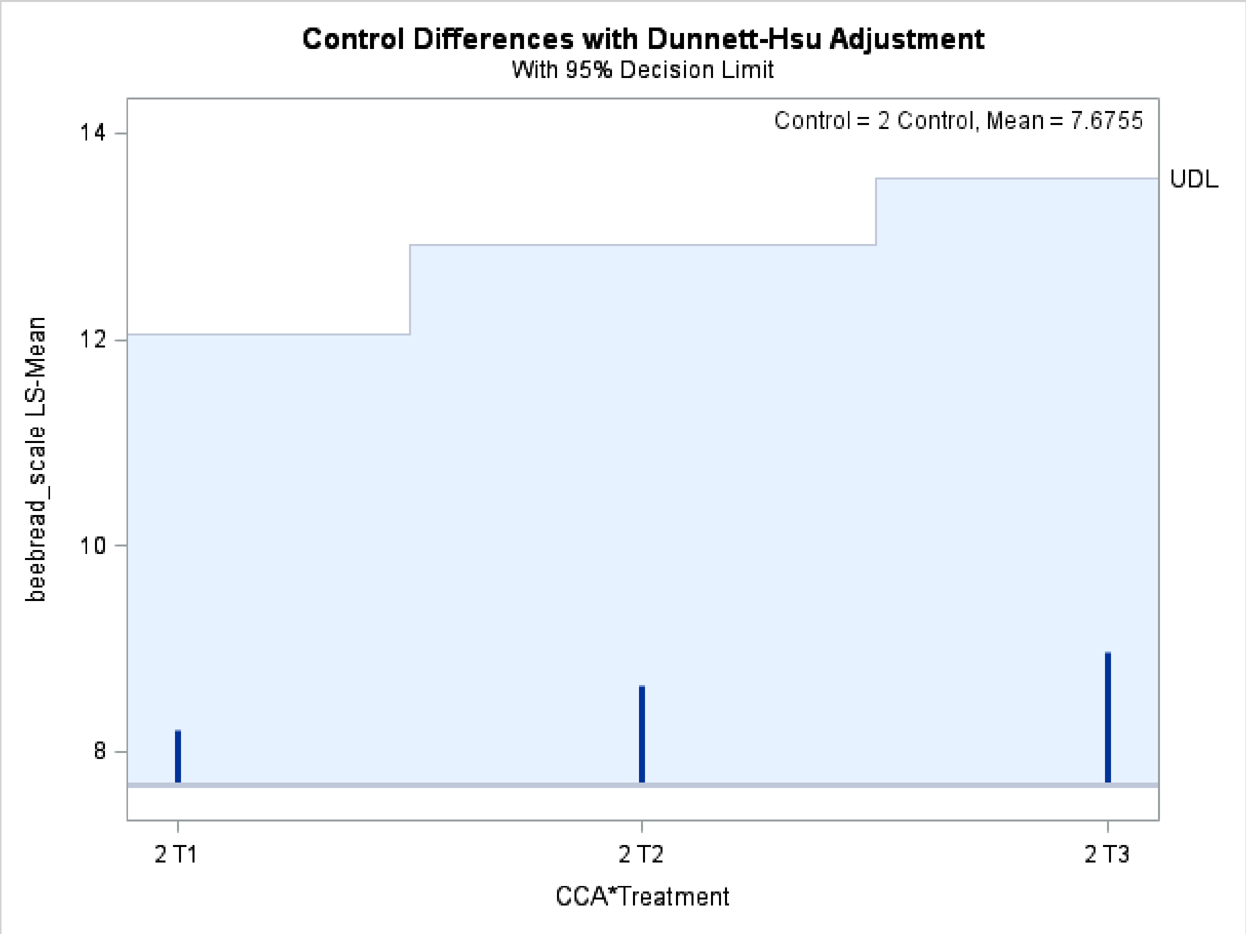
Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	26.7	3.31	0.0352
CCA	4	33.7	32.71	<.0001
CCA*Treatment	11	45.9	2.75	0.0080

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	29.09	0.26	0.8561

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	Control	T1	-0.5375	1.5599	29.09	-0.34	0.6336	0.8570
CCA 2	Control	T2	-0.9675	1.5599	29.09	-0.62	0.7300	0.9162
CCA 2	Control	T3	-1.2900	1.5599	29.09	-0.83	0.7925	0.9467

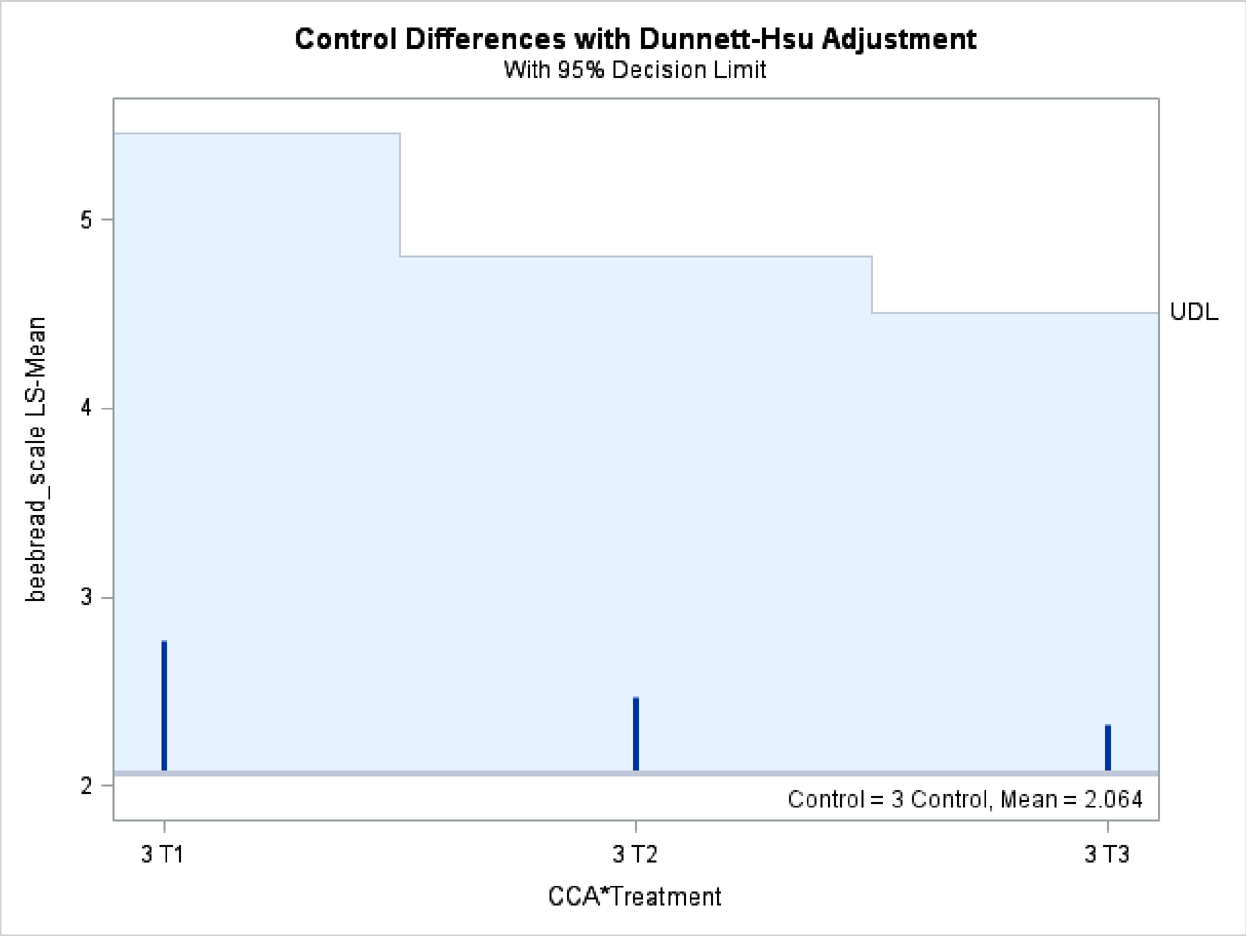


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	18.99	0.19	0.8998

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	-0.6999	0.9420	19.08	-0.74	0.7667	0.9372
CCA 3	**Control**	**T2**	-0.4085	0.9111	18.91	-0.45	0.6705	0.8843
CCA 3	**Control**	**T3**	-0.2580	0.9111	18.91	-0.28	0.6099	0.8432

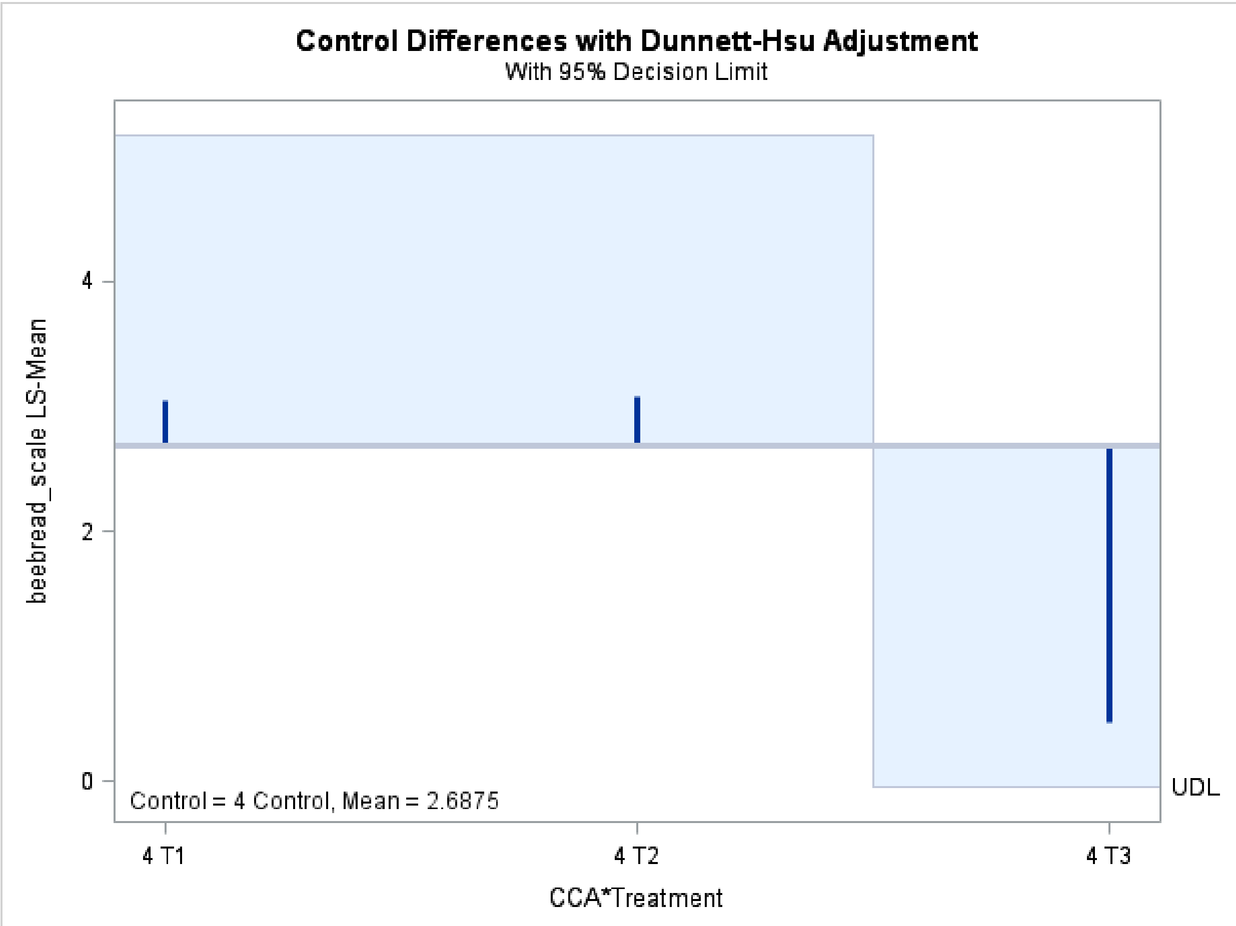


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	27.06	4.76	0.0086

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	-0.3619	0.8281	27.18	-0.44	0.6672	0.8818
CCA 4	**Control**	**T2**	-0.3870	0.8007	26.95	-0.48	0.6836	0.8919
CCA 4	**Control**	**T3**	2.2145	0.8007	26.95	2.77	0.0051	0.0111

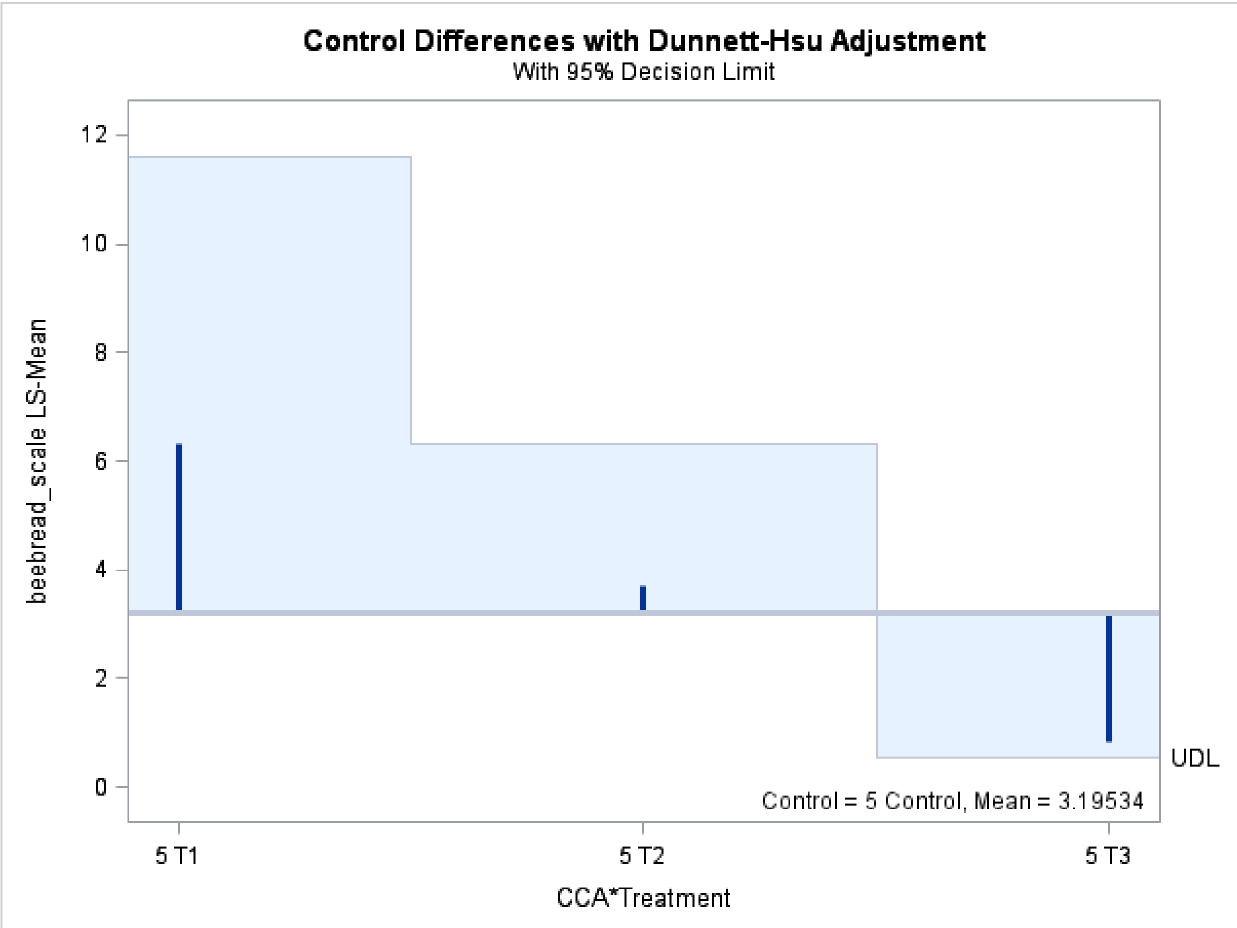


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	22.61	10.04	0.0002

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	-3.1120	1.0346	22.85	-3.01	0.9968	0.9999
CCA 5	**Control**	**T2**	-0.5027	1.0024	22.64	-0.50	0.6896	0.8898
CCA 5	**Control**	**T3**	2.3783	1.0024	22.64	2.37	0.0133	0.0282

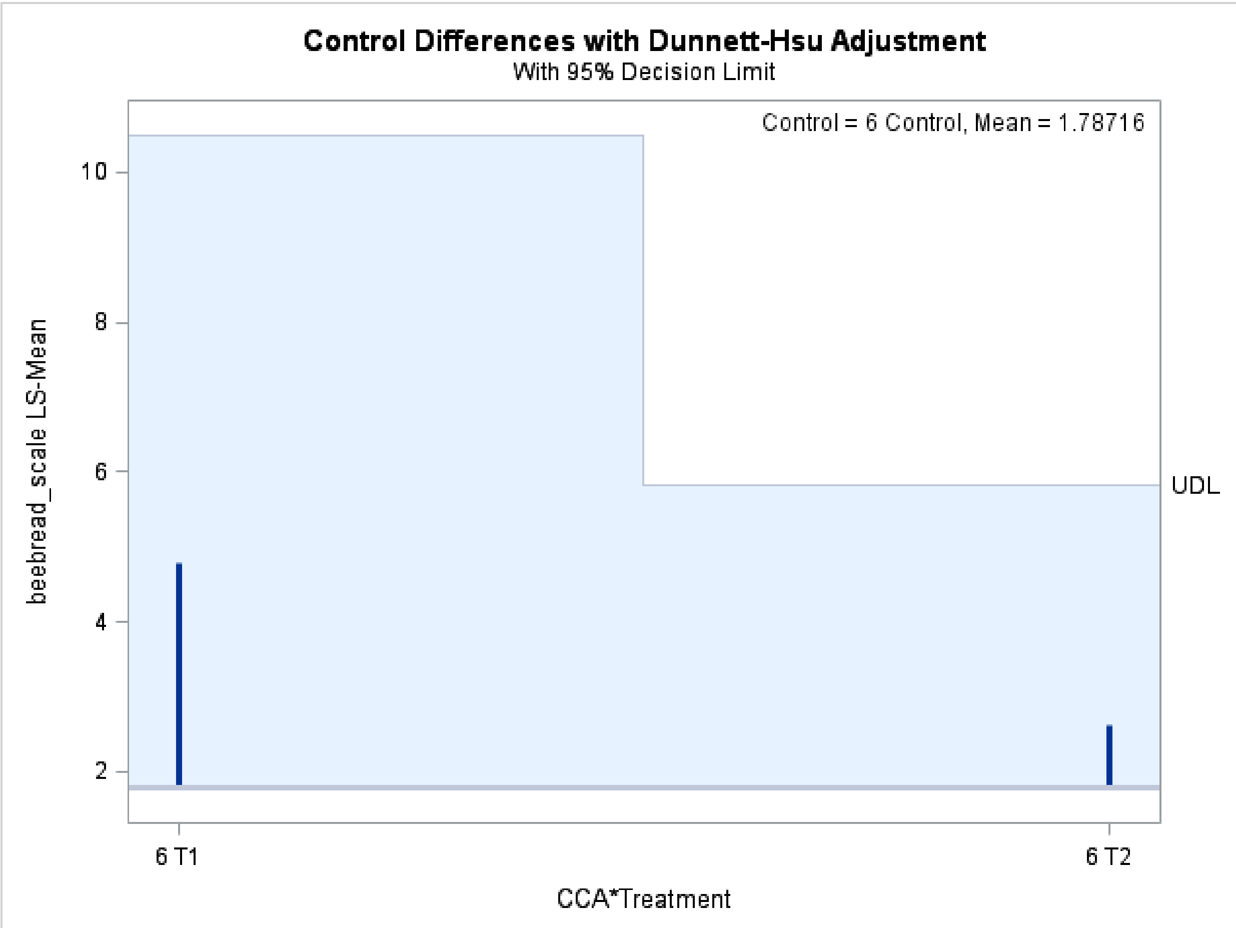


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	15.91	2.38	0.1244

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	-2.9915	1.3796	15.99	-2.17	0.9772	0.9975
CCA 6	**Control**	**T2**	-0.8442	1.1933	15.66	-0.71	0.7552	0.8940

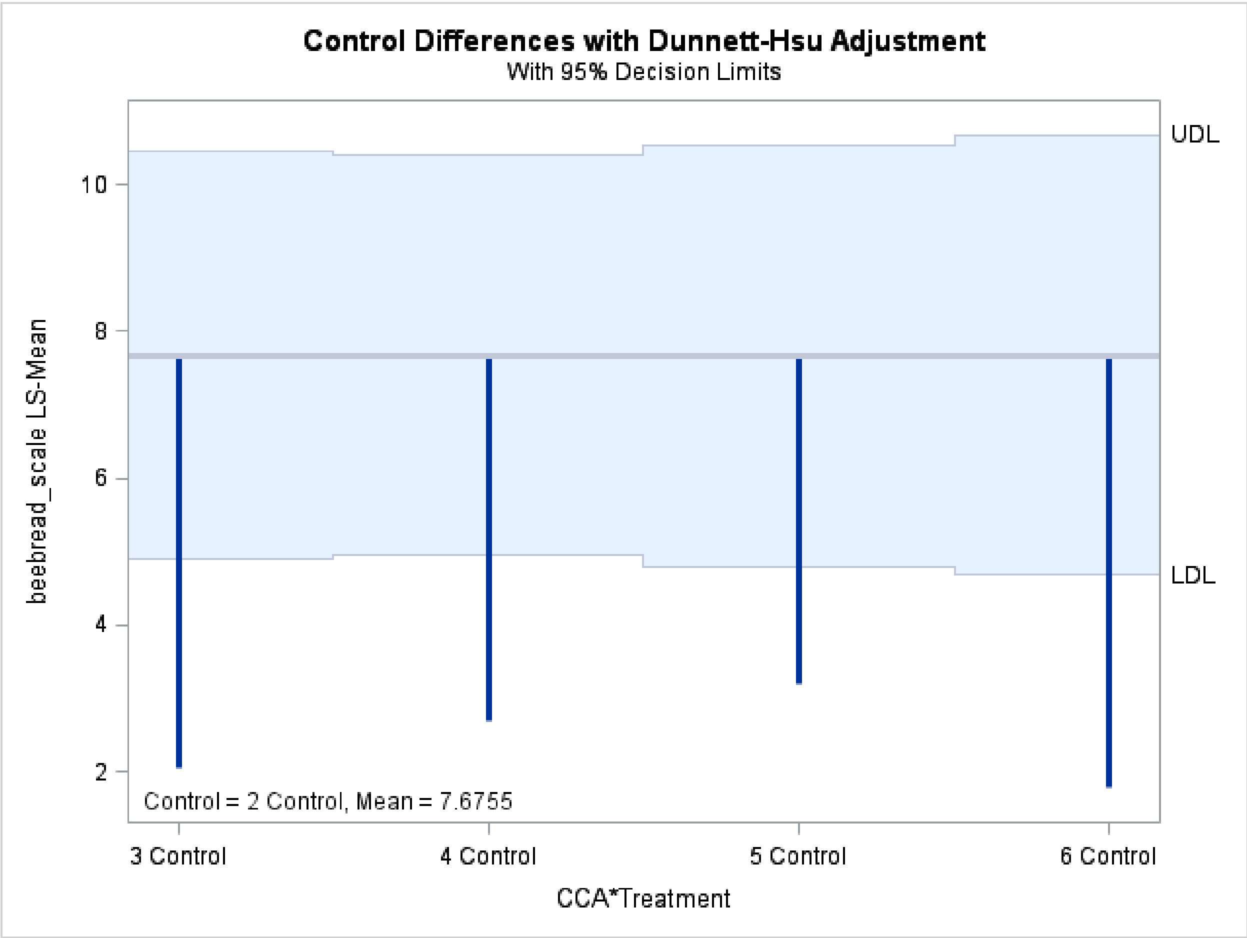


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	33.38	7.15	0.0003

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	-5.6115	1.1332	39.5	-4.95	<.0001	<.0001
Treatment Control	**4**	**2**	-4.9880	1.1098	36.93	-4.49	<.0001	0.0002
Treatment Control	**5**	**2**	-4.4802	1.1739	43.2	-3.82	0.0004	0.0013
Treatment Control	**6**	**2**	-5.8883	1.2248	40.75	-4.81	<.0001	<.0001

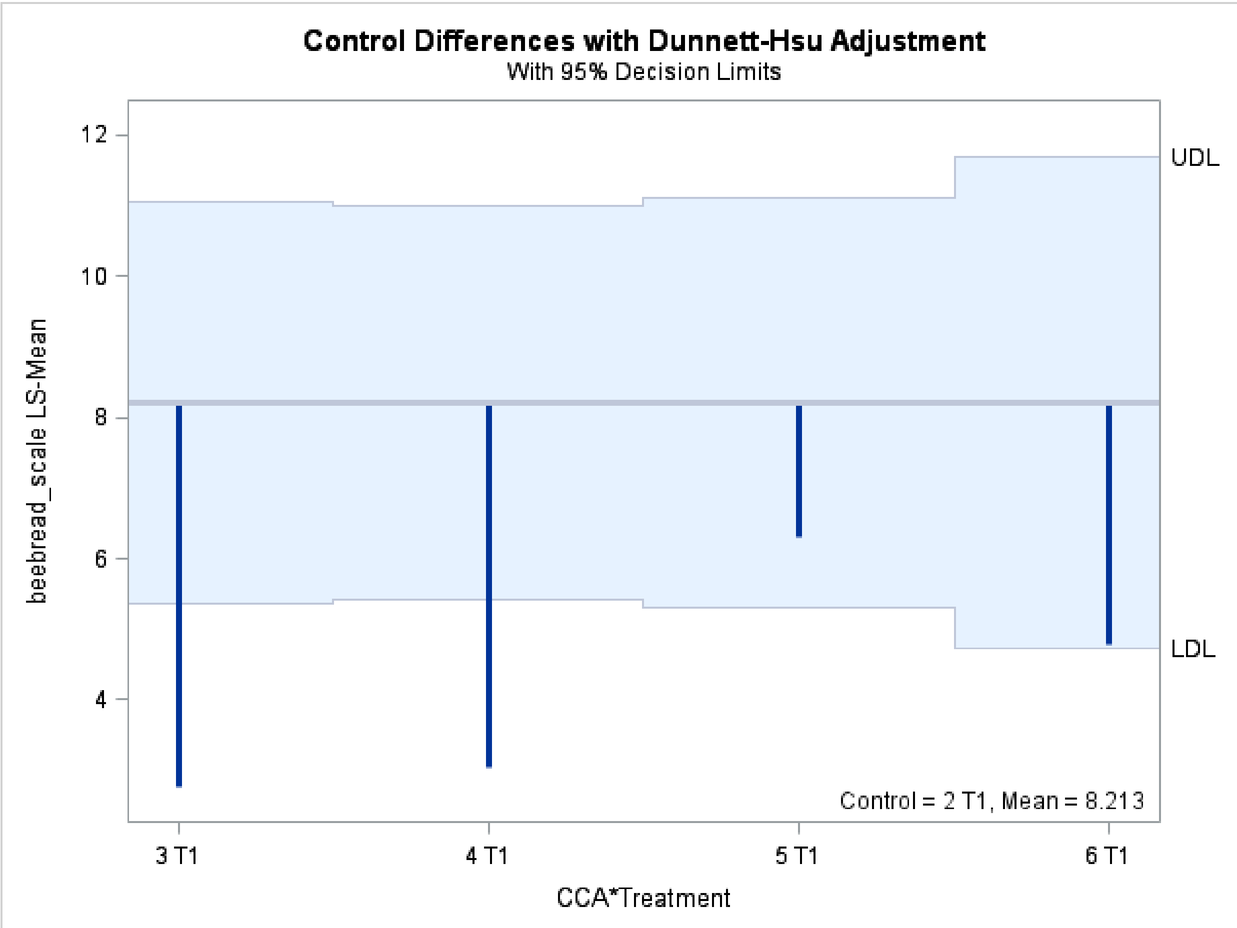


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	33.56	9.33	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	-5.4491	1.1582	41.7	-4.70	<.0001	<.0001
Treatment T1	**4**	**2**	-5.1636	1.1298	39.01	-4.57	<.0001	0.0001
Treatment T1	**5**	**2**	-1.9057	1.1761	43.6	-1.62	0.1124	0.2701
Treatment T1	**6**	**2**	-3.4343	1.4069	38.7	-2.44	0.0193	0.0531

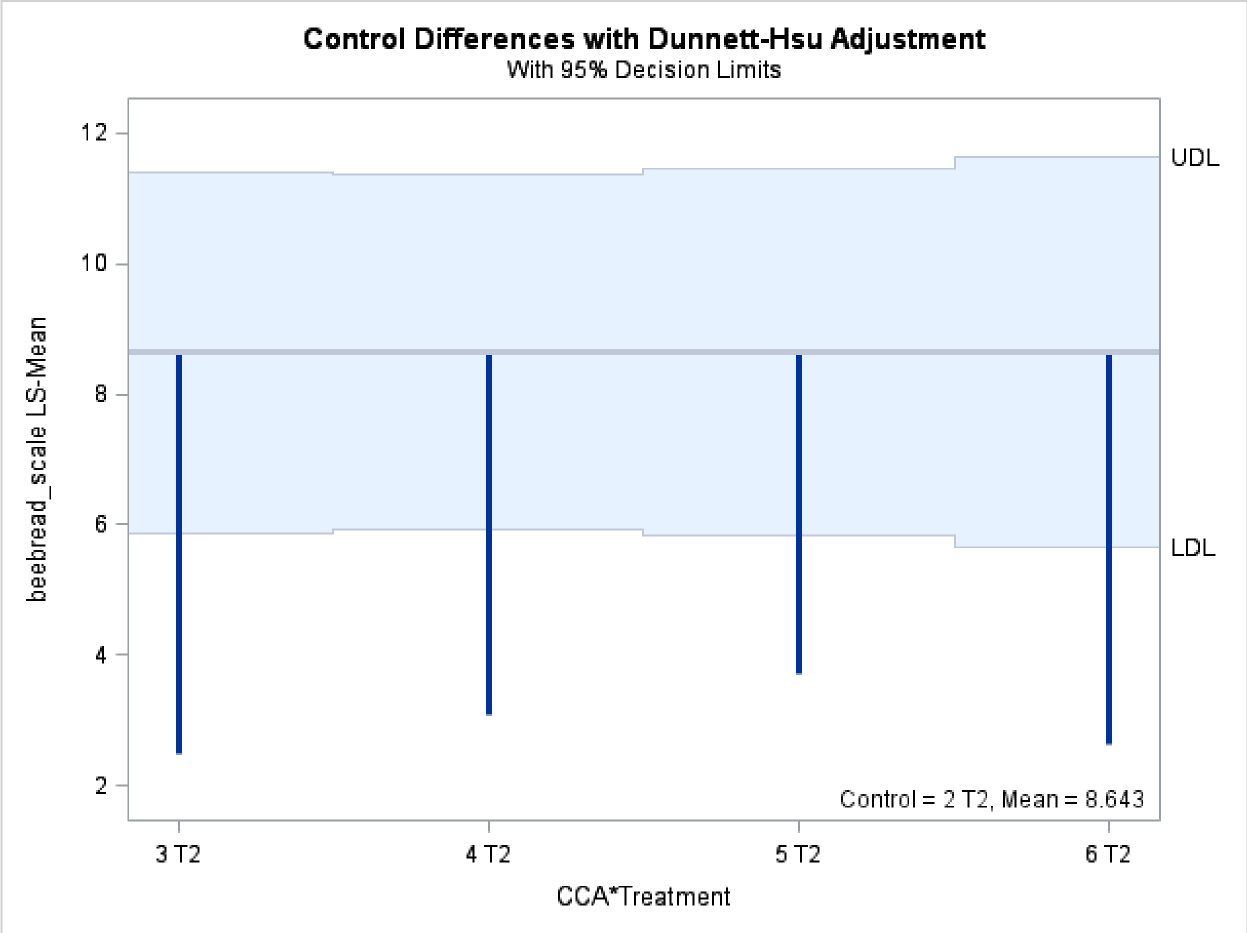


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	32.72	8.22	0.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	-6.1705	1.1332	39.5	-5.45	<.0001	<.0001
Treatment T2	**4**	**2**	-5.5685	1.1098	36.93	-5.02	<.0001	<.0001
Treatment T2	**5**	**2**	-4.9450	1.1481	41.13	-4.31	0.0001	0.0003
Treatment T2	**6**	**2**	-6.0116	1.2241	40.68	-4.91	<.0001	<.0001

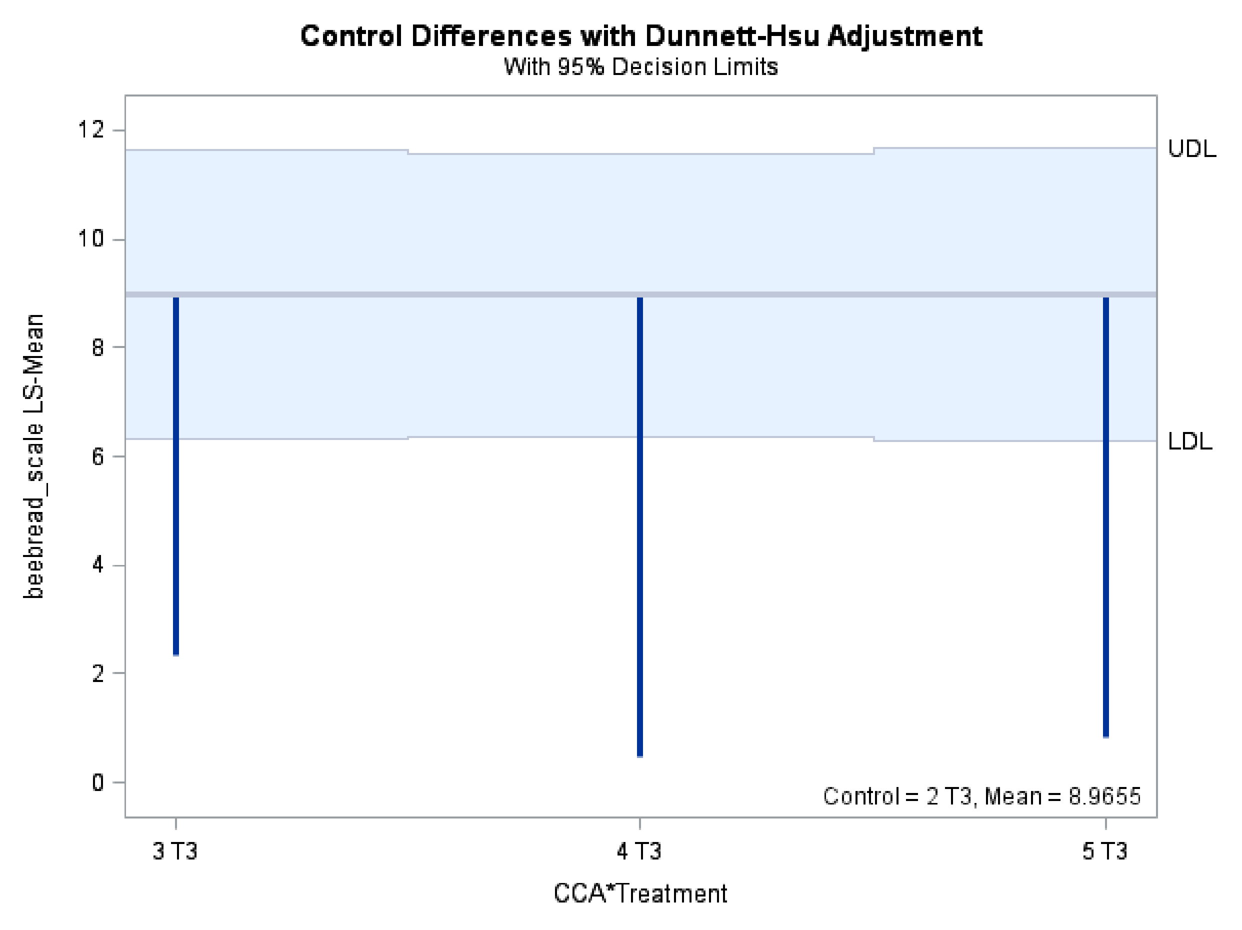


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	41.45	21.05	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-6.6435	1.1332	39.5	-5.86	<.0001	<.0001
Treatment T3	**4**	**2**	-8.4925	1.1098	36.93	-7.65	<.0001	<.0001
Treatment T3	**5**	**2**	-8.1485	1.1481	41.13	-7.10	<.0001	<.0001



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	7.6755	1.1532	27.5	6.66	<.0001	0.05	5.3112	10.0398
CCA*Treatment	**T1**	**2**	8.2130	1.1532	27.5	7.12	<.0001	0.05	5.8487	10.5773
CCA*Treatment	**T2**	**2**	8.6430	1.1532	27.5	7.49	<.0001	0.05	6.2787	11.0073
CCA*Treatment	**T3**	**2**	8.9655	1.1532	27.5	7.77	<.0001	0.05	6.6012	11.3298
CCA*Treatment	**Control**	**3**	2.0640	0.7268	12.8	2.84	0.0141	0.05	0.4910	3.6370
CCA*Treatment	**T1**	**3**	2.7639	0.7653	13.8	3.61	0.0029	0.05	1.1203	4.4075
CCA*Treatment	**T2**	**3**	2.4725	0.7268	12.8	3.40	0.0048	0.05	0.8995	4.0455
CCA*Treatment	**T3**	**3**	2.3220	0.7268	12.8	3.19	0.0072	0.05	0.7490	3.8950

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**4**	2.6875	0.6586	16.7	4.08	0.0008	0.05	1.2959	4.0791
CCA*Treatment	**T1**	**4**	3.0494	0.6918	18.8	4.41	0.0003	0.05	1.6007	4.4982
CCA*Treatment	**T2**	**4**	3.0745	0.6586	16.7	4.67	0.0002	0.05	1.6829	4.4661
CCA*Treatment	**T3**	**4**	0.4730	0.6586	16.7	0.72	0.4826	0.05	-0.9186	1.8646
CCA*Treatment	**Control**	**5**	3.1953	0.8035	22.5	3.98	0.0006	0.05	1.5310	4.8597
CCA*Treatment	**T1**	**5**	6.3073	0.8067	22.4	7.82	<.0001	0.05	4.6362	7.9784
CCA*Treatment	**T2**	**5**	3.6980	0.7653	20.8	4.83	<.0001	0.05	2.1056	5.2904
CCA*Treatment	**T3**	**5**	0.8170	0.7653	20.8	1.07	0.2980	0.05	-0.7754	2.4094
CCA*Treatment	**Control**	**6**	1.7872	0.9088	17.8	1.97	0.0651	0.05	-0.1239	3.6982
CCA*Treatment	**T1**	**6**	4.7787	1.1425	18.7	4.18	0.0005	0.05	2.3848	7.1726
CCA*Treatment	**T2**	**6**	2.6314	0.9079	17.8	2.90	0.0097	0.05	0.7223	4.5404

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - capped honey_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	caphoney_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations	
Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	962.08074895	
1	2	860.81370027	0.00653140
2	1	858.28489013	0.00151635
3	1	857.72740212	0.00014311
4	1	857.67912464	0.00000180
5	1	857.67855223	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		21.1429
Var(1)	Treatme*hive(Apiary)	86.8274
Var(2)	Treatme*hive(Apiary)	61.4905
Var(3)	Treatme*hive(Apiary)	51.2983
Var(4)	Treatme*hive(Apiary)	122.89
Var(5)	Treatme*hive(Apiary)	254.19
CSH	Treatme*hive(Apiary)	0.7133

Fit Statistics

-2 Res Log Likelihood	857.7
AIC (Smaller is Better)	871.7
AICC (Smaller is Better)	872.7
BIC (Smaller is Better)	867.4

Type 3 Tests of Fixed Effects

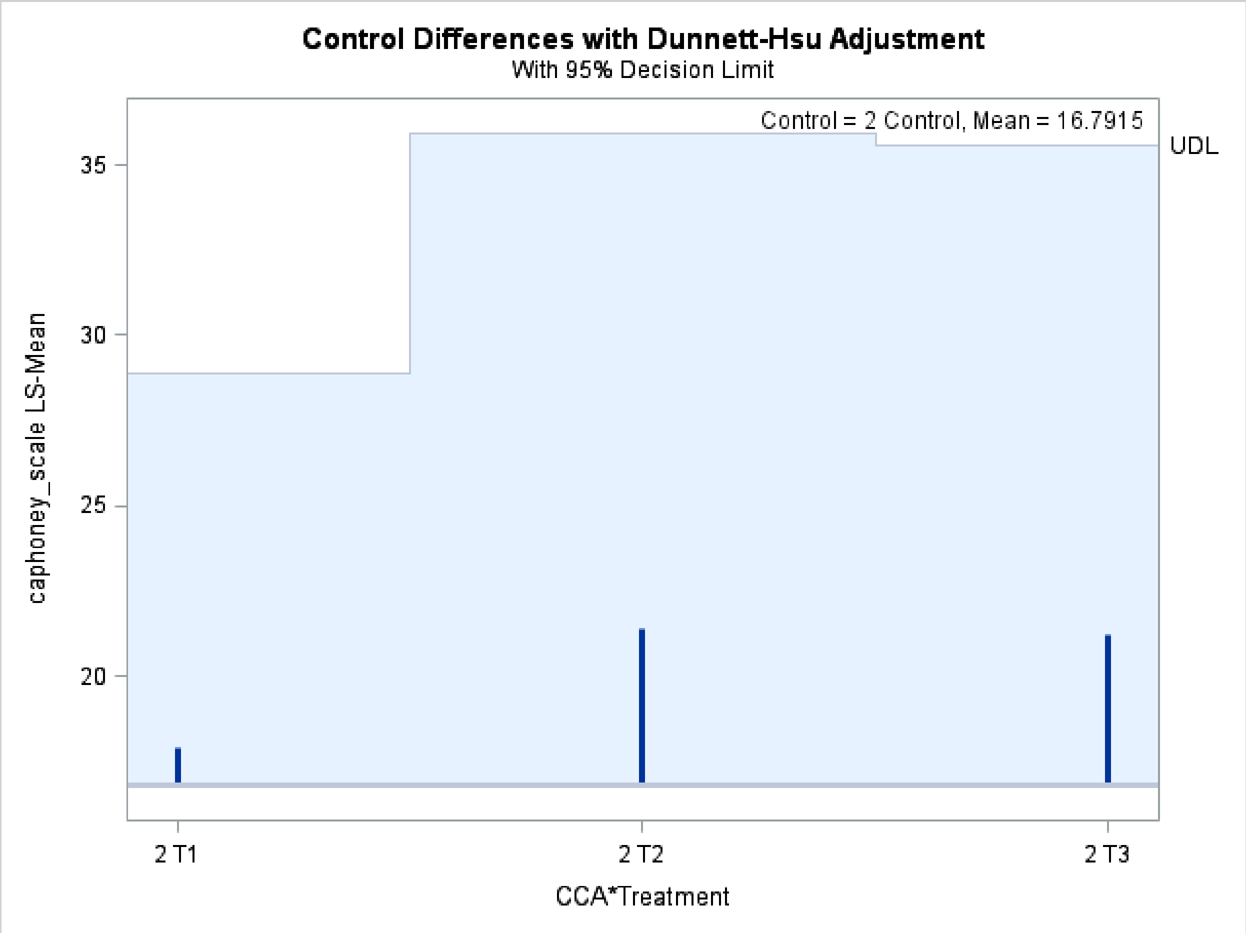
Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	26.3	0.67	0.5784
CCA	4	27.6	17.03	<.0001
CCA*Treatment	11	36	2.18	0.0386

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	26.13	0.50	0.6828

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	**Control**	**T1**	-1.0750	4.6591	26.13	-0.23	0.5903	0.8256
CCA 2	**Control**	**T2**	-4.6010	4.6591	26.13	-0.99	0.8338	0.9632
CCA 2	**Control**	**T3**	-4.4290	4.6591	26.13	-0.95	0.8247	0.9598

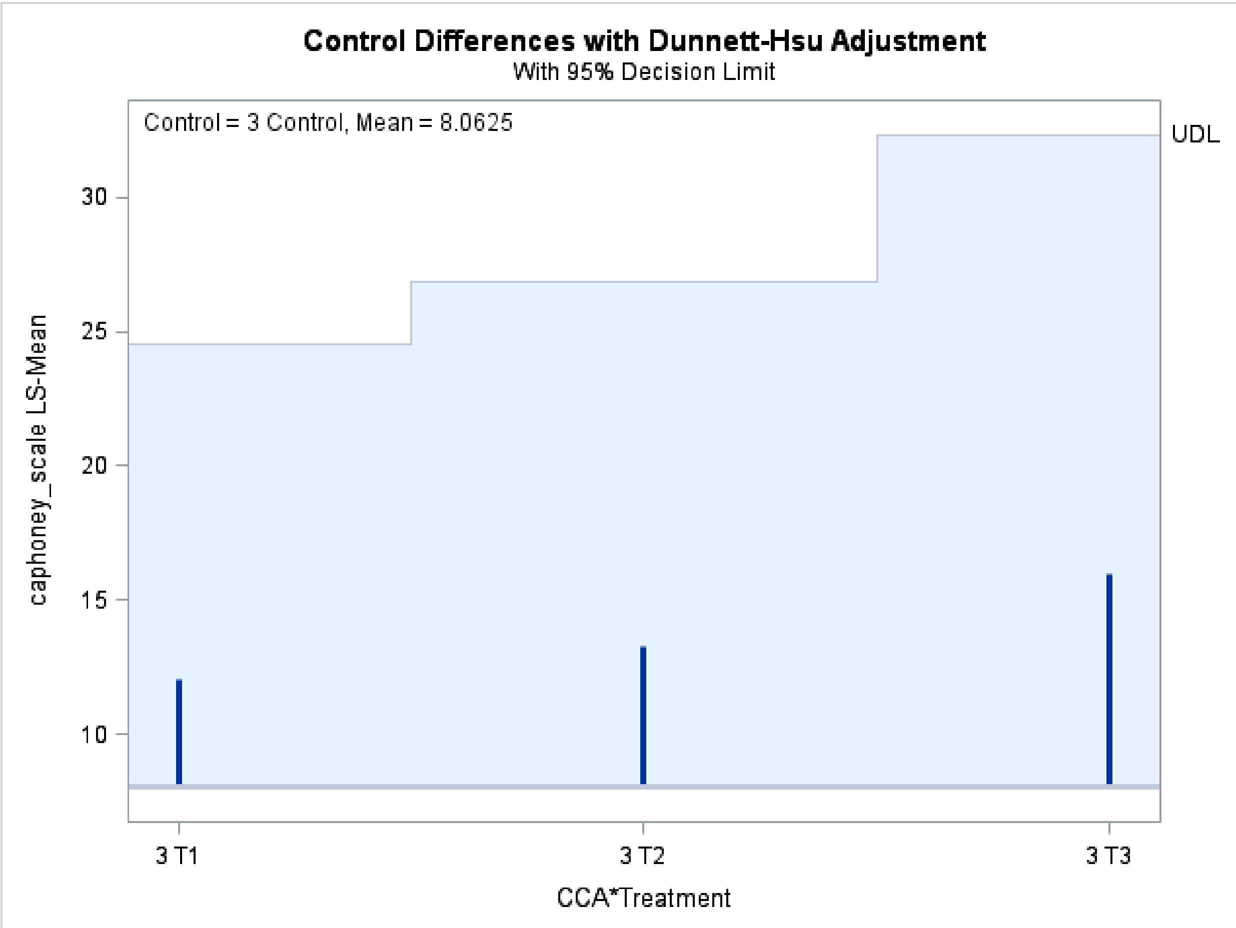


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	27.82	1.42	0.2590

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	-3.9633	3.9903	28.29	-0.99	0.8355	0.9643
CCA 3	**Control**	**T2**	-5.2245	3.9208	27.38	-1.33	0.9032	0.9852
CCA 3	**Control**	**T3**	-7.9335	3.9208	27.38	-2.02	0.9736	0.9982

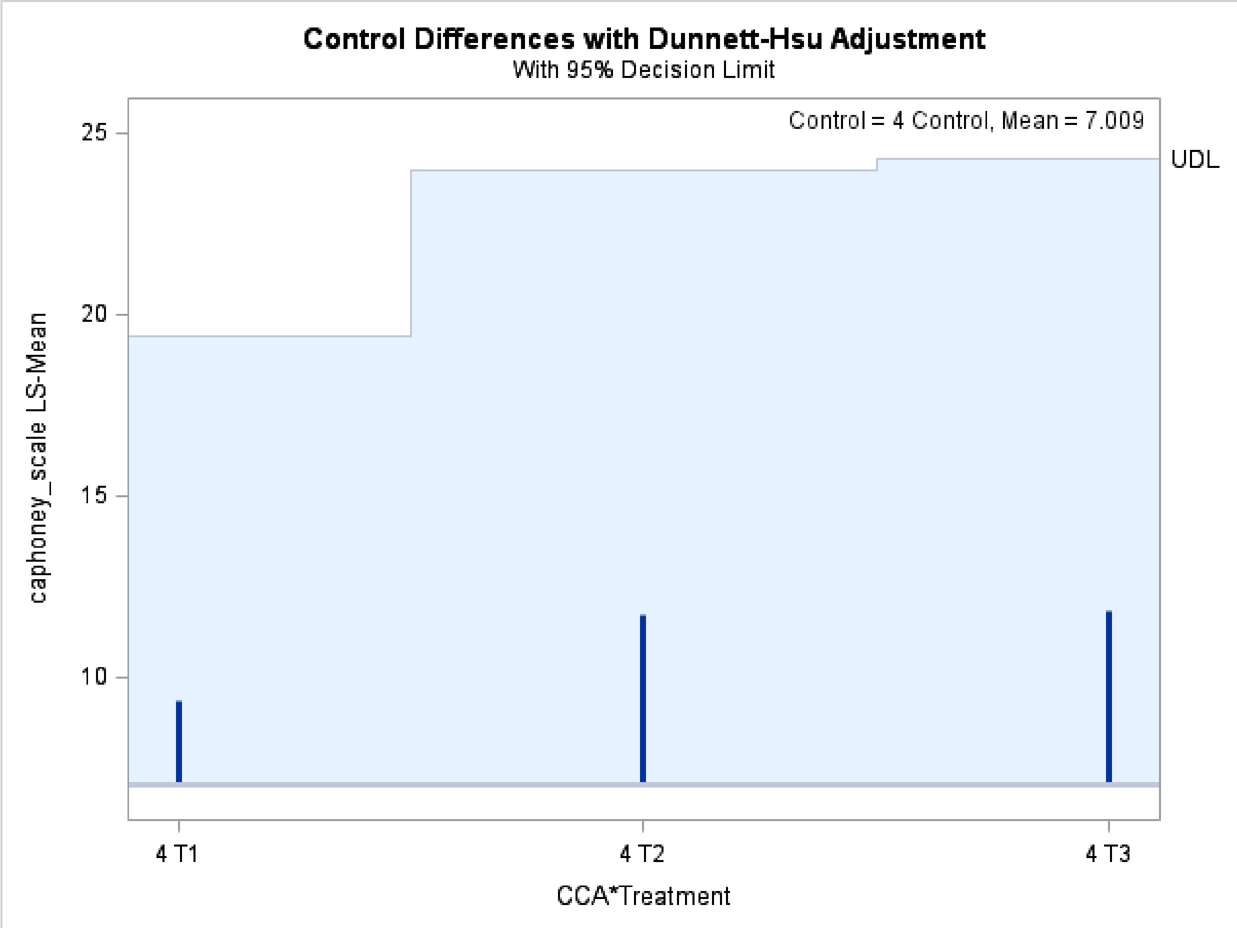


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	27.73	0.81	0.5012

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	-2.3105	3.6452	28.23	-0.63	0.7344	0.9193
CCA 4	**Control**	**T2**	-4.6655	3.5811	27.26	-1.30	0.8982	0.9840
CCA 4	**Control**	**T3**	-4.8160	3.5811	27.26	-1.34	0.9051	0.9857

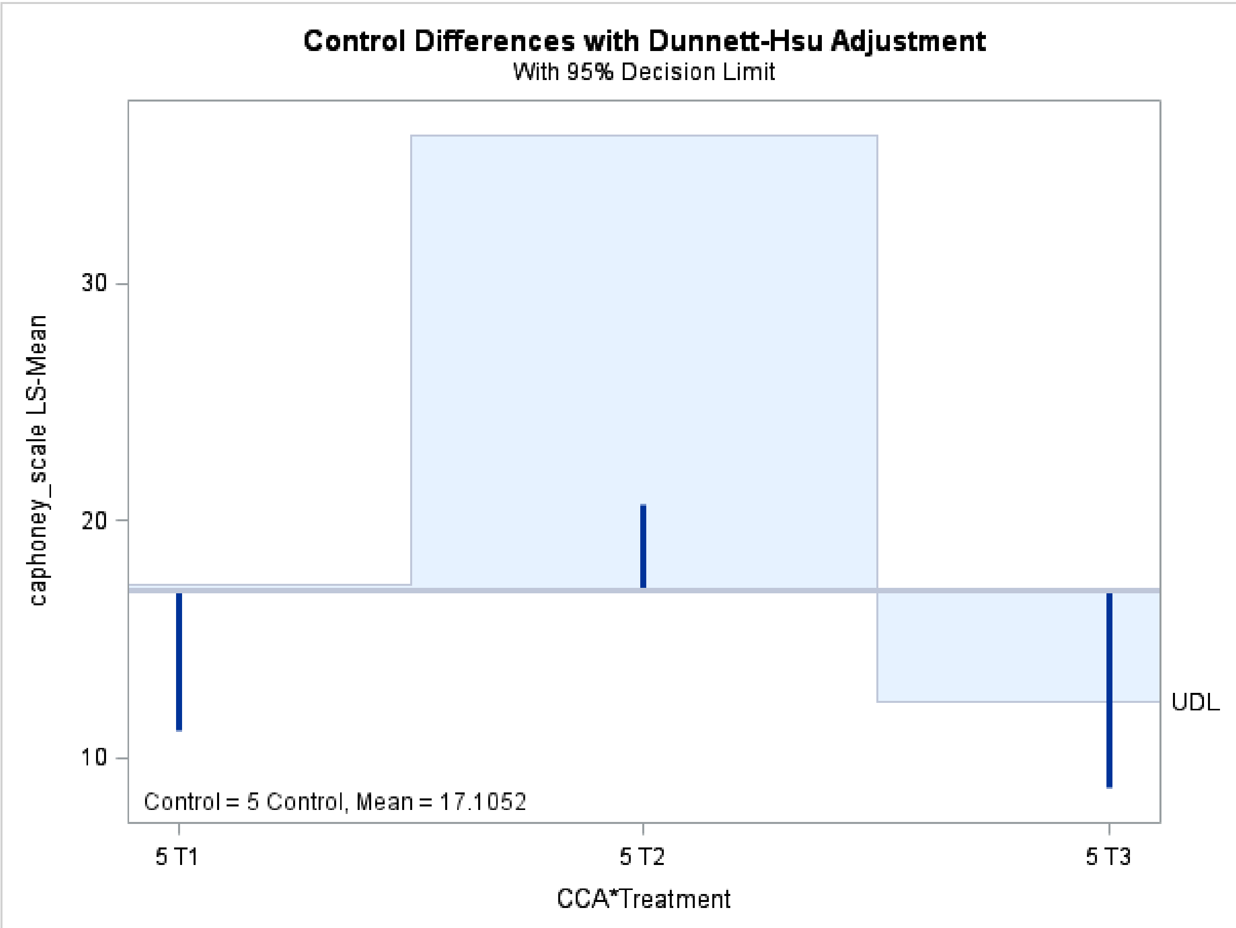


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	25.56	1.92	0.1519

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	5.9857	5.7113	26.27	1.05	0.1521	0.3064
CCA 5	**Control**	**T2**	-3.5778	5.6161	25.52	-0.64	0.7351	0.9176
CCA 5	**Control**	**T3**	8.3547	5.6161	25.52	1.49	0.0746	0.1634

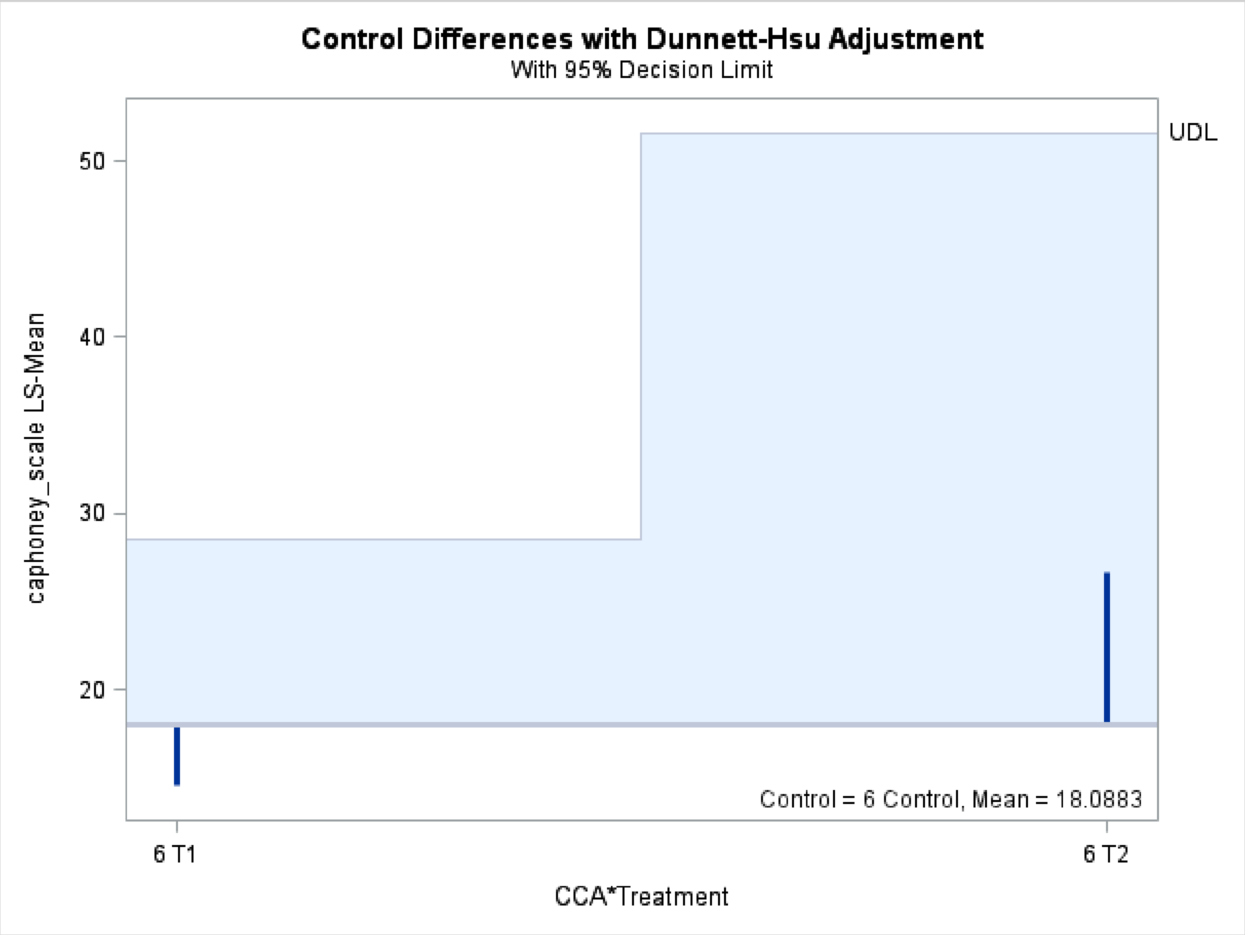


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	18.4	1.06	0.3674

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	3.4936	8.7930	18.96	0.40	0.3478	0.5055
CCA 6	**Control**	**T2**	-8.6335	8.1802	17.56	-1.06	0.8472	0.9453

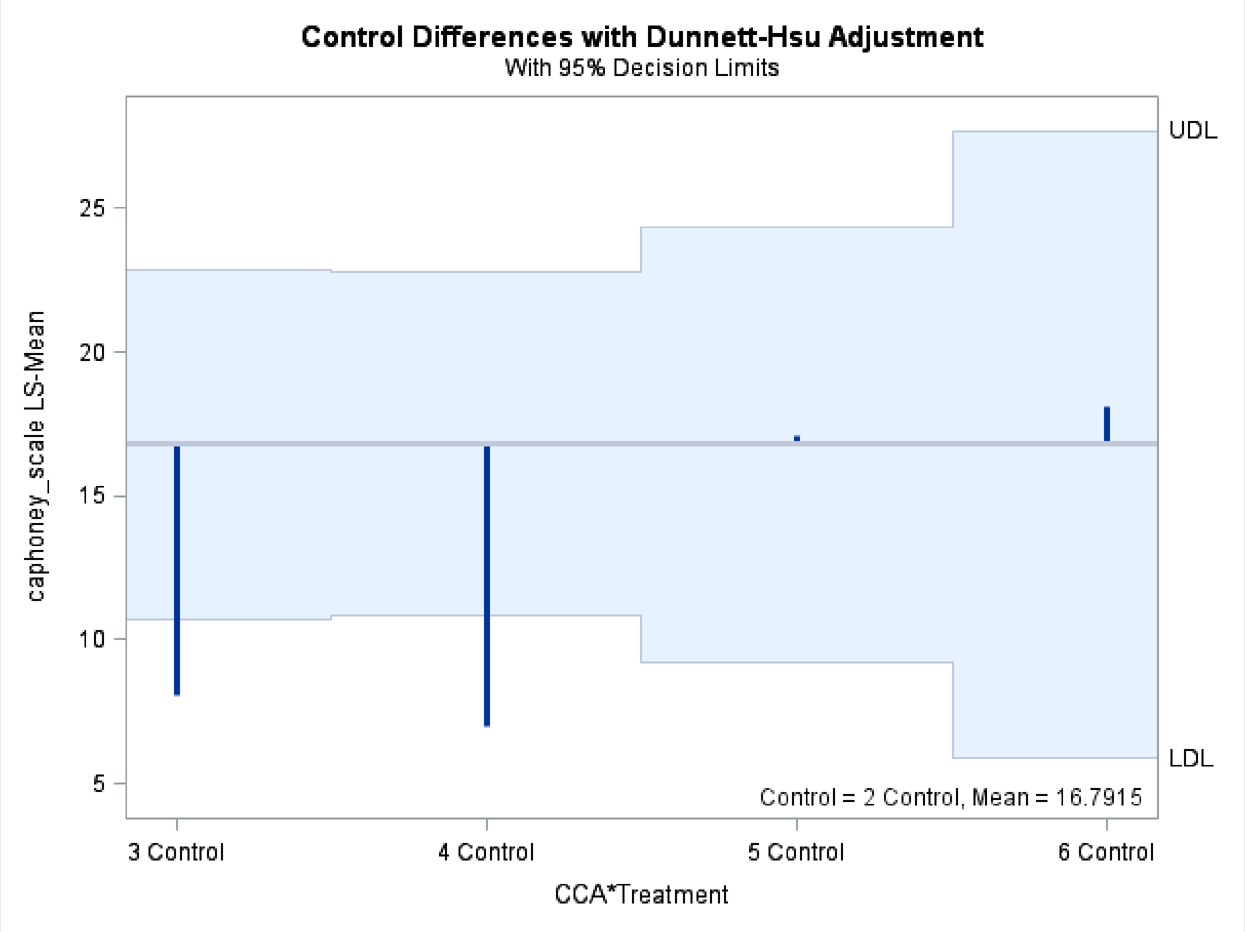


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	44.13	6.47	0.0003

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	-8.7290	2.3472	47.58	-3.72	0.0005	0.0026
Treatment Control	**4**	**2**	-9.7825	2.3160	43.96	-4.22	0.0001	0.0006
Treatment Control	**5**	**2**	0.3137	2.9345	53.68	0.11	0.9153	0.9999
Treatment Control	**6**	**2**	1.2968	4.2254	18.54	0.31	0.7623	0.9949

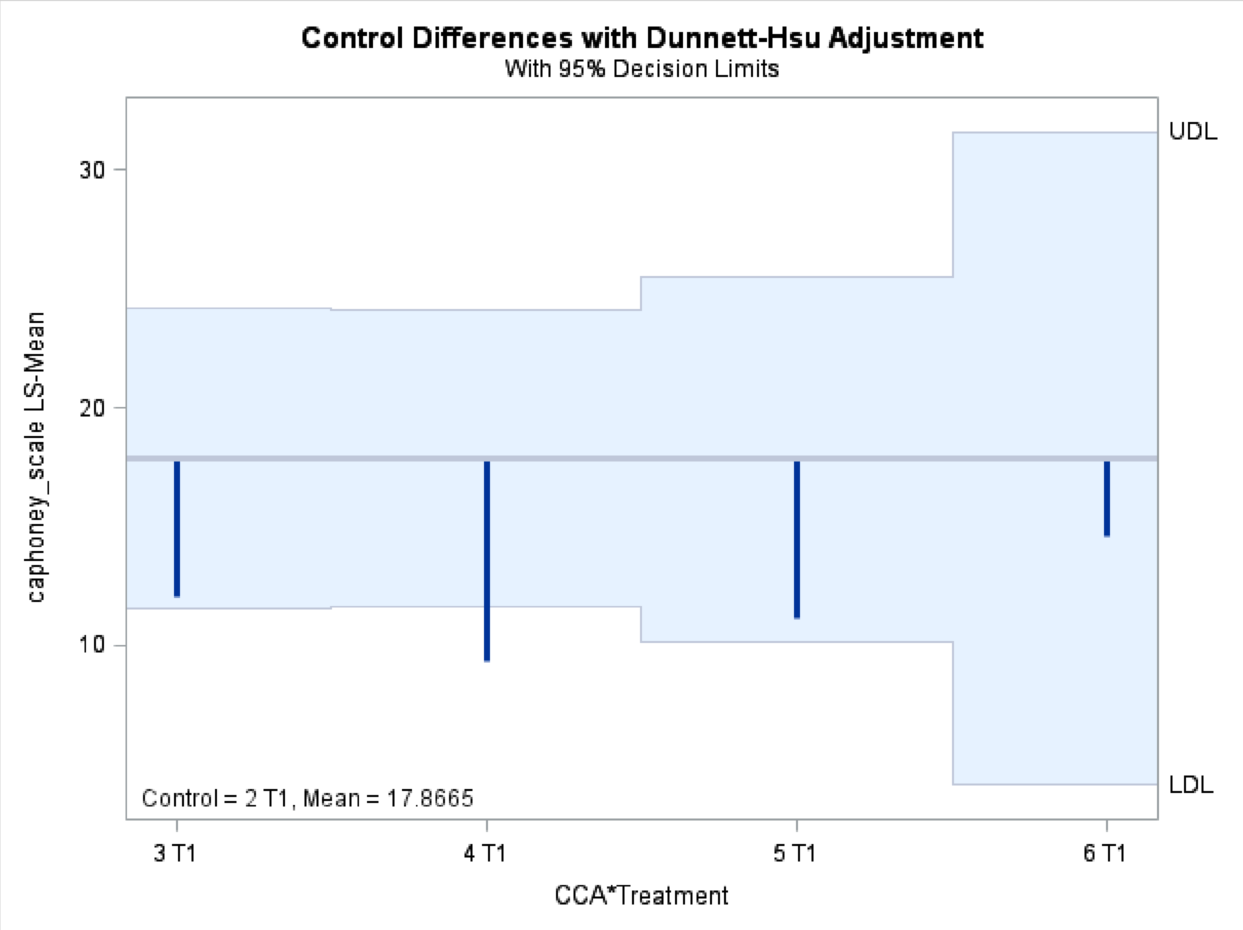


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	41.09	3.32	0.0190

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	-5.8407	2.4615	51.14	-2.37	0.0214	0.0797
Treatment T1	**4**	**2**	-8.5470	2.4140	49.13	-3.54	0.0009	0.0043
Treatment T1	**5**	**2**	-6.7470	2.9788	53.96	-2.26	0.0276	0.1007
Treatment T1	**6**	**2**	-3.2718	5.3245	19.74	-0.61	0.5459	0.9379

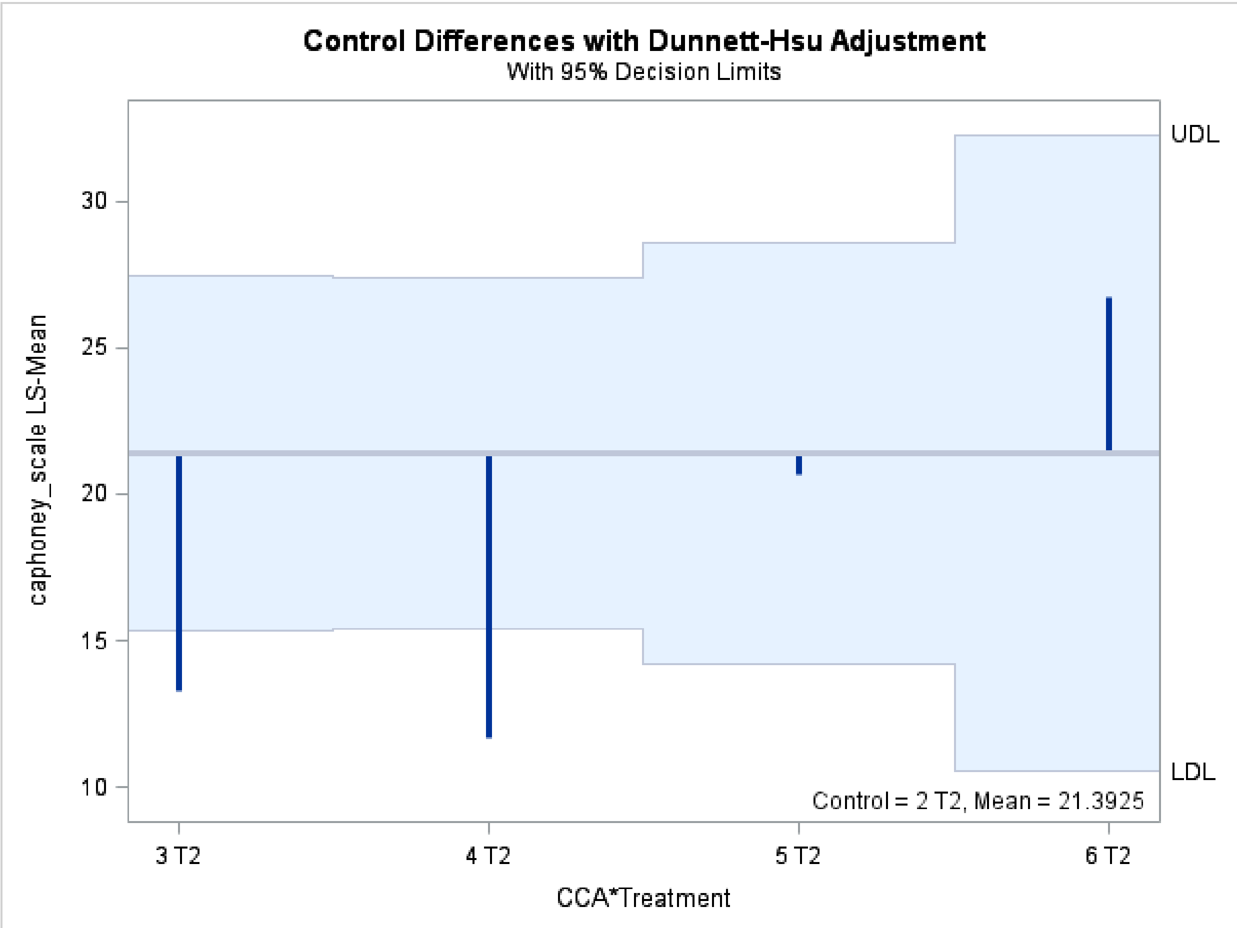


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	42.57	6.49	0.0004

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	-8.1055	2.3472	47.58	-3.45	0.0012	0.0054
Treatment T2	**4**	**2**	-9.7180	2.3160	43.96	-4.20	0.0001	0.0007
Treatment T2	**5**	**2**	-0.7095	2.7918	55.29	-0.25	0.8003	0.9975
Treatment T2	**6**	**2**	5.3292	4.2142	18.53	1.26	0.2217	0.5564

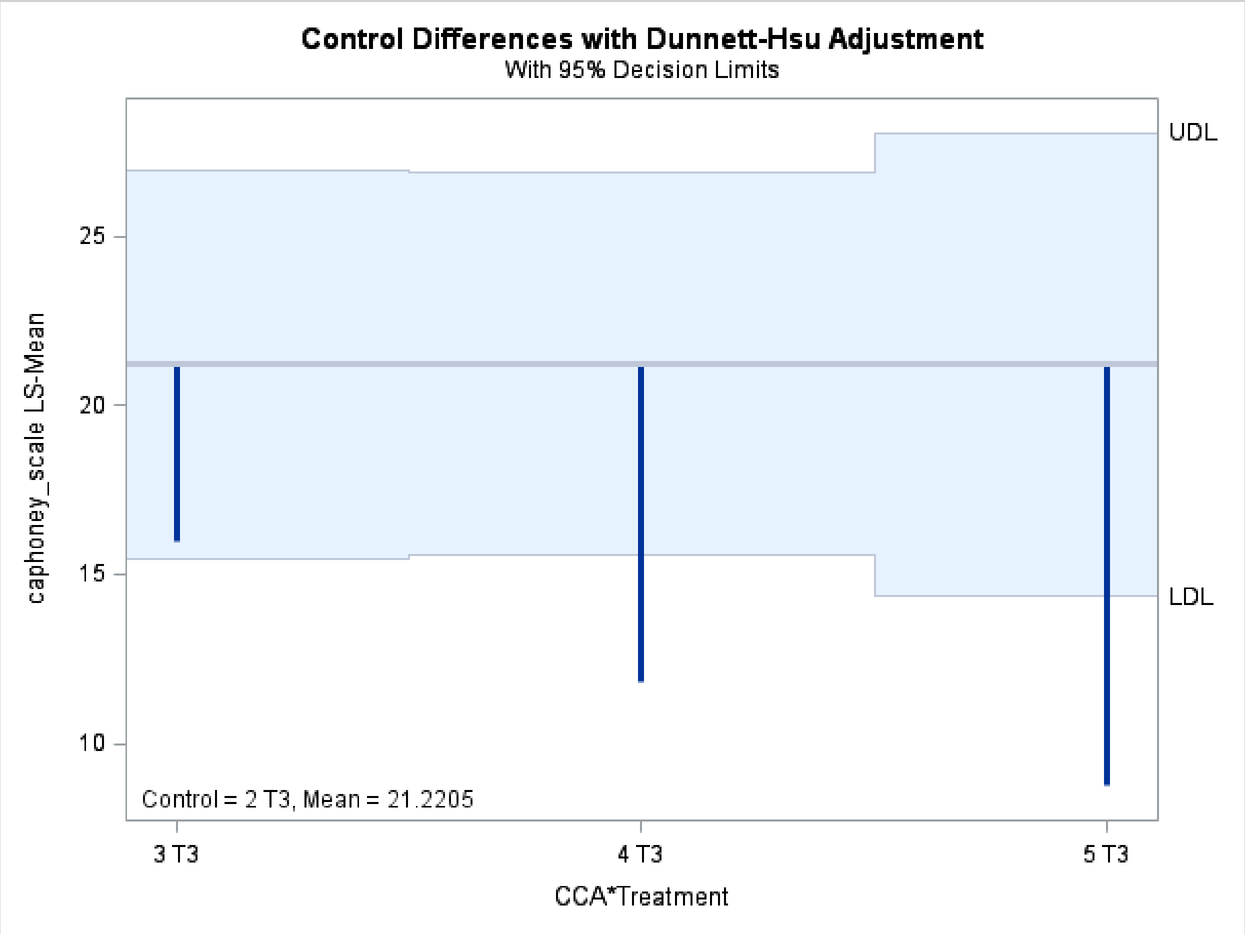


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	44.81	8.98	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-5.2245	2.3472	47.58	-2.23	0.0308	0.0817
Treatment T3	**4**	**2**	-9.3955	2.3160	43.96	-4.06	0.0002	0.0007
Treatment T3	**5**	**2**	-12.4700	2.7918	55.29	-4.47	<.0001	0.0002



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	16.7915	4.0174	13.9	4.18	0.0009	0.05	8.1697	25.4133
CCA*Treatment	**T1**	**2**	17.8665	4.0174	13.9	4.45	0.0006	0.05	9.2447	26.4883
CCA*Treatment	**T2**	**2**	21.3925	4.0174	13.9	5.33	0.0001	0.05	12.7707	30.0143
CCA*Treatment	**T3**	**2**	21.2205	4.0174	13.9	5.28	0.0001	0.05	12.5987	29.8423
CCA*Treatment	**Control**	**3**	8.0625	3.6017	9.88	2.24	0.0494	0.05	0.02444	16.1006

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**T1**	**3**	12.0258	3.6772	10.7	3.27	0.0077	0.05	3.9038	20.1477
CCA*Treatment	**T2**	**3**	13.2870	3.6017	9.88	3.69	0.0043	0.05	5.2489	21.3251
CCA*Treatment	**T3**	**3**	15.9960	3.6017	9.88	4.44	0.0013	0.05	7.9579	24.0341
CCA*Treatment	**Control**	**4**	7.0090	3.4202	7.32	2.05	0.0778	0.05	-1.0069	15.0249
CCA*Treatment	**T1**	**4**	9.3195	3.4873	7.84	2.67	0.0288	0.05	1.2486	17.3903
CCA*Treatment	**T2**	**4**	11.6745	3.4202	7.32	3.41	0.0105	0.05	3.6586	19.6904
CCA*Treatment	**T3**	**4**	11.8250	3.4202	7.32	3.46	0.0099	0.05	3.8091	19.8409
CCA*Treatment	**Control**	**5**	17.1052	4.6330	16.4	3.69	0.0019	0.05	7.3051	26.9052
CCA*Treatment	**T1**	**5**	11.1195	4.6612	16.7	2.39	0.0292	0.05	1.2716	20.9674
CCA*Treatment	**T2**	**5**	20.6830	4.5440	15.5	4.55	0.0004	0.05	11.0263	30.3397
CCA*Treatment	**T3**	**5**	8.7505	4.5440	15.5	1.93	0.0726	0.05	-0.9062	18.4072
CCA*Treatment	**Control**	**6**	18.0883	6.2273	17.7	2.90	0.0096	0.05	4.9911	31.1855
CCA*Treatment	**T1**	**6**	14.5947	7.0197	20.2	2.08	0.0506	0.05	-0.03846	29.2278
CCA*Treatment	**T2**	**6**	26.7217	6.2197	17.7	4.30	0.0004	0.05	13.6396	39.8039

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - uncapped nectar_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	uncapnec_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations

Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	1017.17721024	
1	2	951.85628681	0.00009061
2	1	951.82200264	0.00000047
3	1	951.82183279	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		0.7714
Var(1)	**Treatme*hive(Apiary)**	23.5511
Var(2)	**Treatme*hive(Apiary)**	401.73
Var(3)	**Treatme*hive(Apiary)**	264.37
Var(4)	**Treatme*hive(Apiary)**	69.1596
Var(5)	**Treatme*hive(Apiary)**	77.8976
CSH	**Treatme*hive(Apiary)**	0.2760

Fit Statistics

-2 Res Log Likelihood	951.8
AIC (Smaller is Better)	965.8
AICC (Smaller is Better)	966.8
BIC (Smaller is Better)	961.5

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	27.9	7.00	0.0012
CCA	4	50.1	13.80	<.0001

Type 3 Tests of Fixed Effects

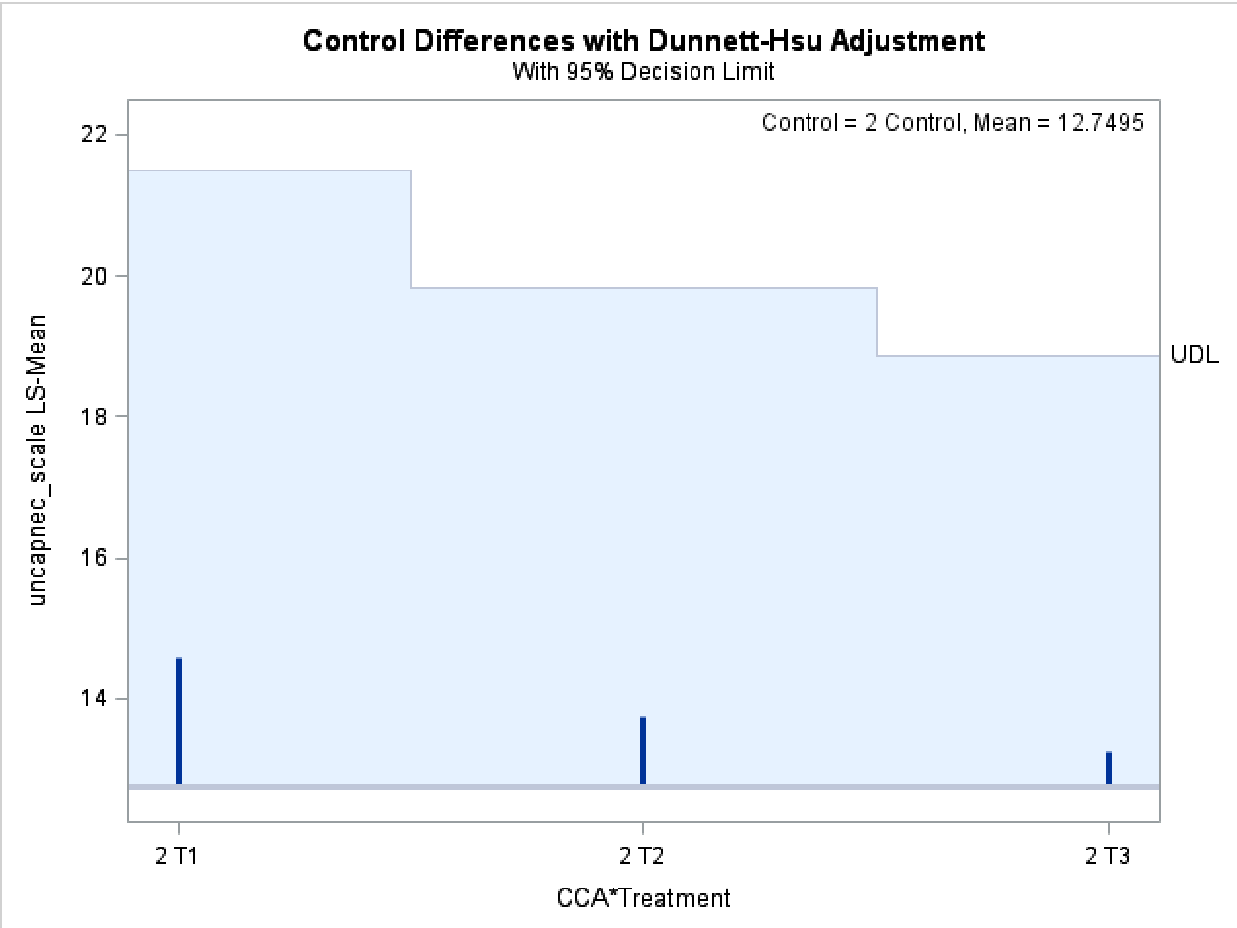
Effect	Num DF	Den DF	F Value	Pr > F
CCA*Treatment	11	63.1	6.73	<.0001

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	28.9	0.20	0.8923

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	**Control**	**T1**	-1.8275	2.4265	28.9	-0.75	0.7713	0.9374
CCA 2	**Control**	**T2**	-0.9890	2.4265	28.9	-0.41	0.6567	0.8728
CCA 2	**Control**	**T3**	-0.5160	2.4265	28.9	-0.21	0.5835	0.8205

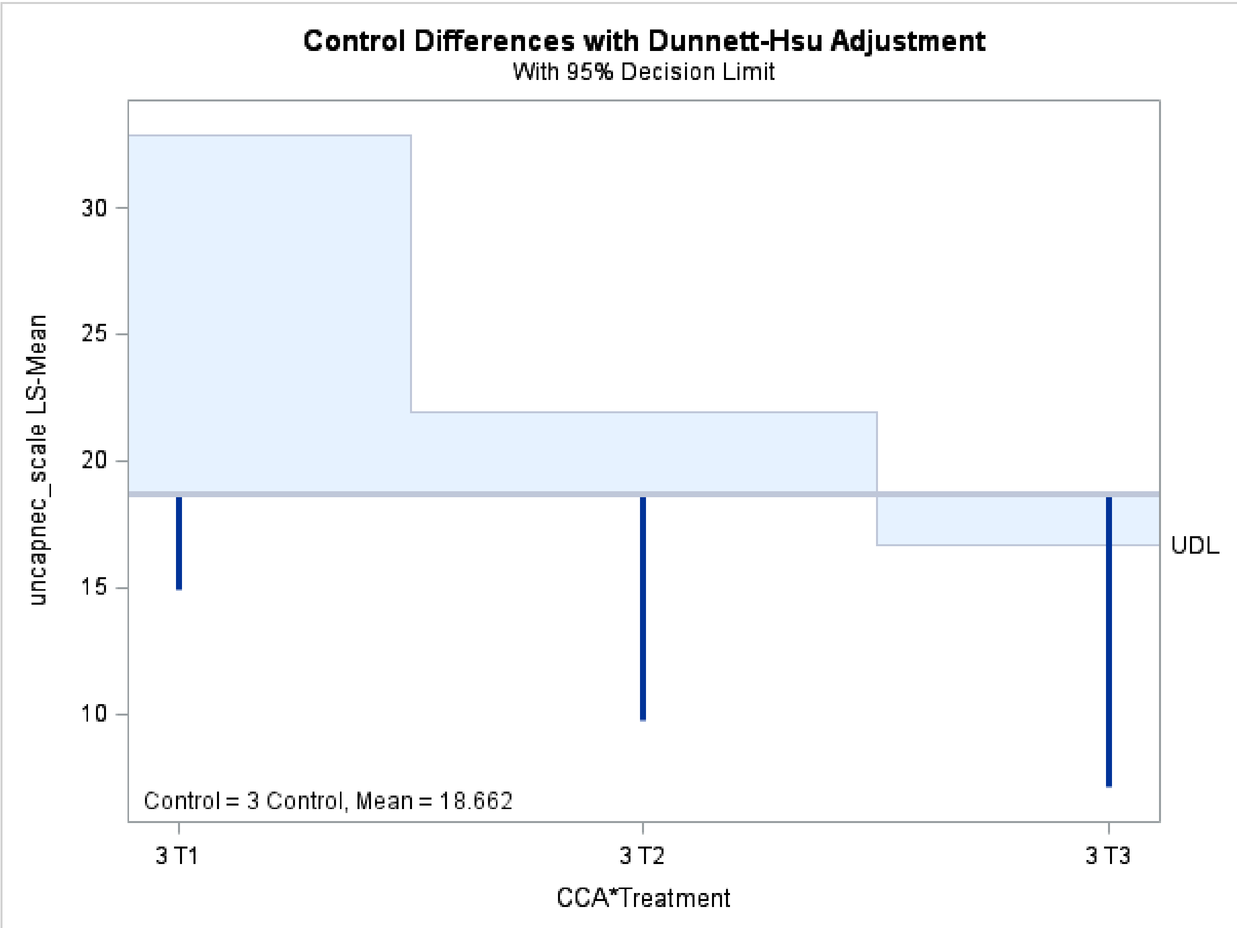


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	25.81	0.53	0.6675

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	3.7845	10.3470	25.9	0.37	0.3588	0.6048
CCA 3	**Control**	**T2**	8.9010	10.0216	25.72	0.89	0.1913	0.3728
CCA 3	**Control**	**T3**	11.5455	10.0216	25.72	1.15	0.1299	0.2682

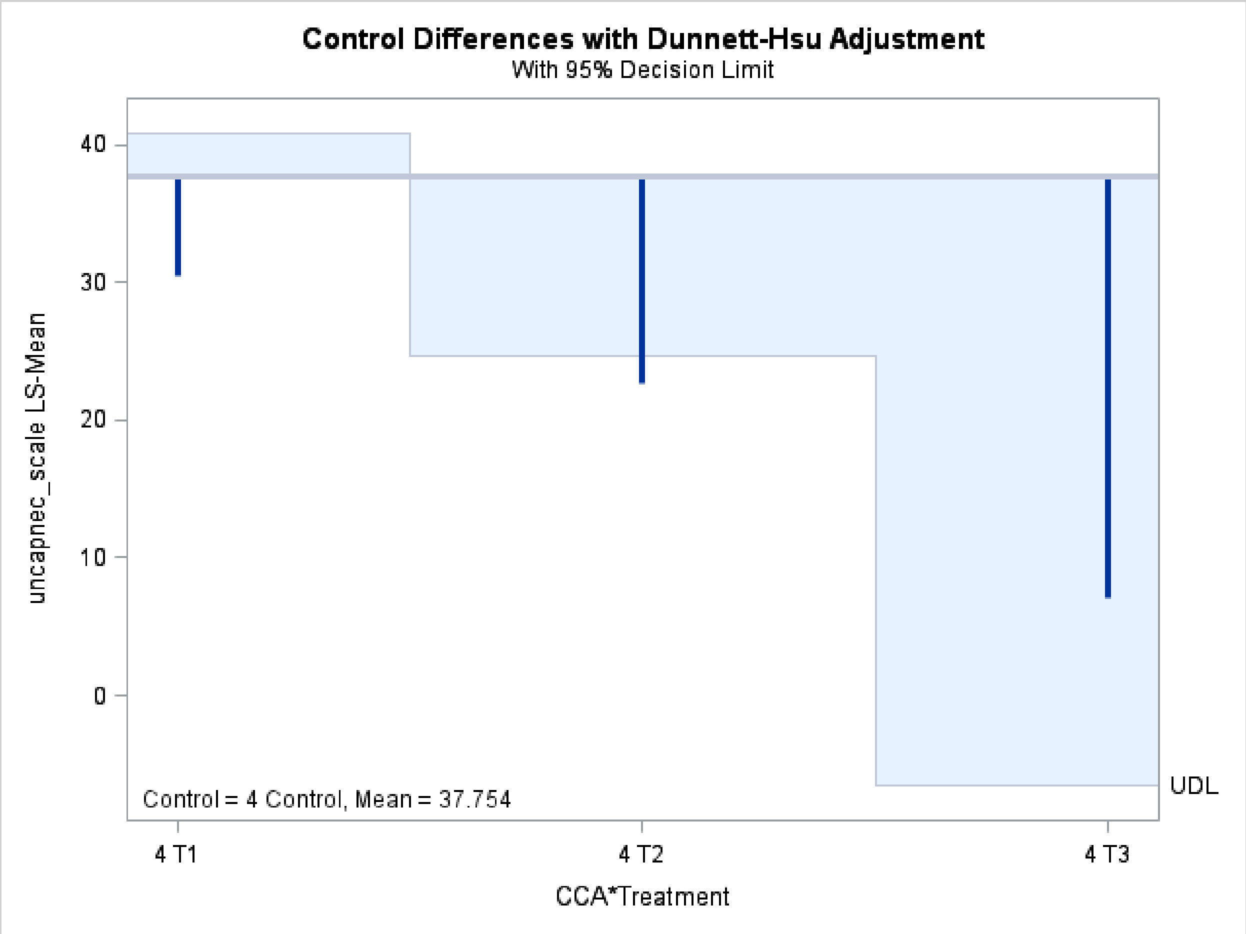


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	26.81	5.19	0.0059

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	7.2823	8.3937	26.91	0.87	0.1966	0.3816
CCA 4	**Control**	**T2**	15.0930	8.1297	26.72	1.86	0.0372	0.0833
CCA 4	**Control**	**T3**	30.7020	8.1297	26.72	3.78	0.0004	0.0005

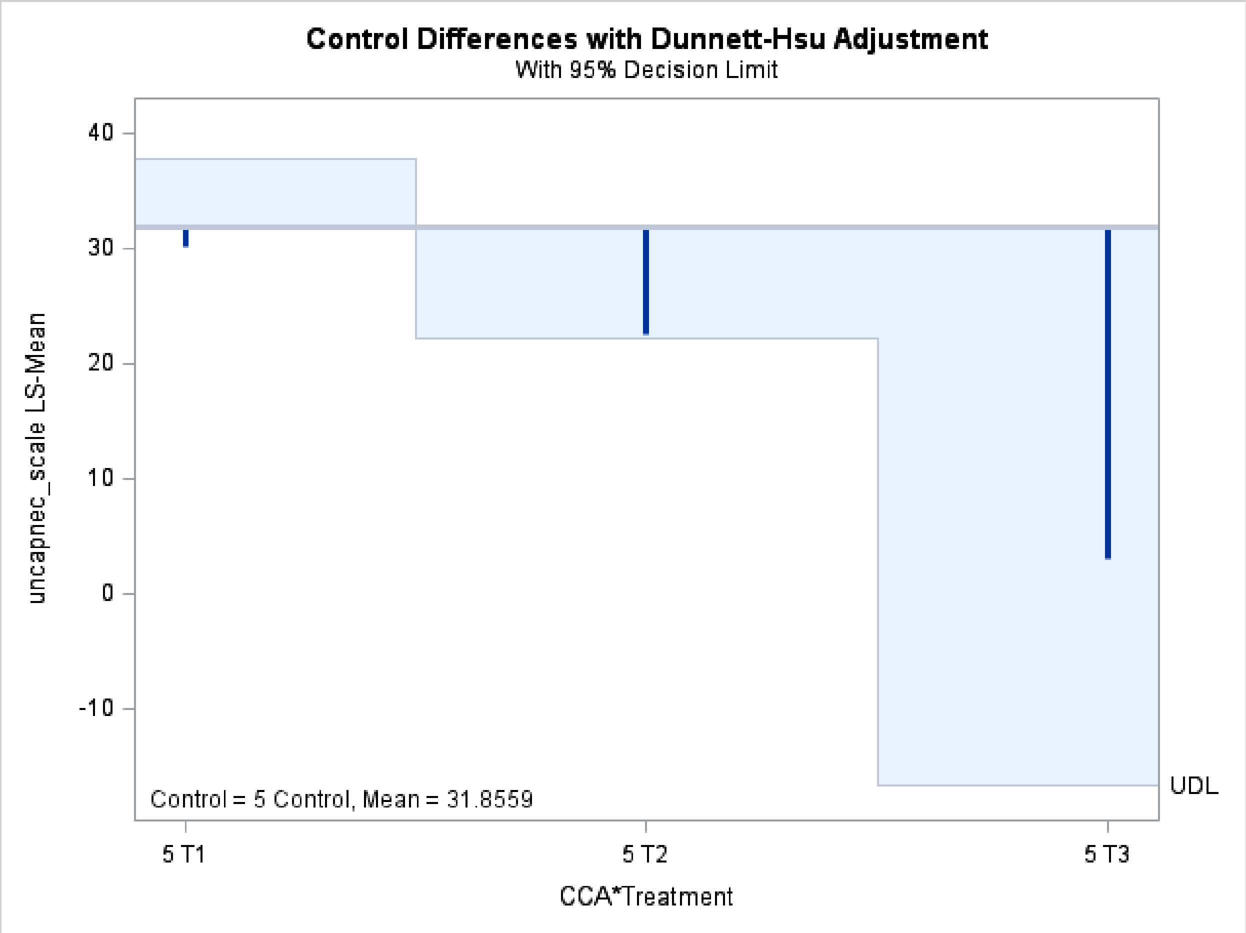


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	26.42	19.32	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	1.6727	4.4148	26.64	0.38	0.3539	0.5910
CCA 5	**Control**	**T2**	9.3454	4.2832	26.47	2.18	0.0191	0.0416
CCA 5	**Control**	**T3**	28.7384	4.2832	26.47	6.71	<.0001	<.0001

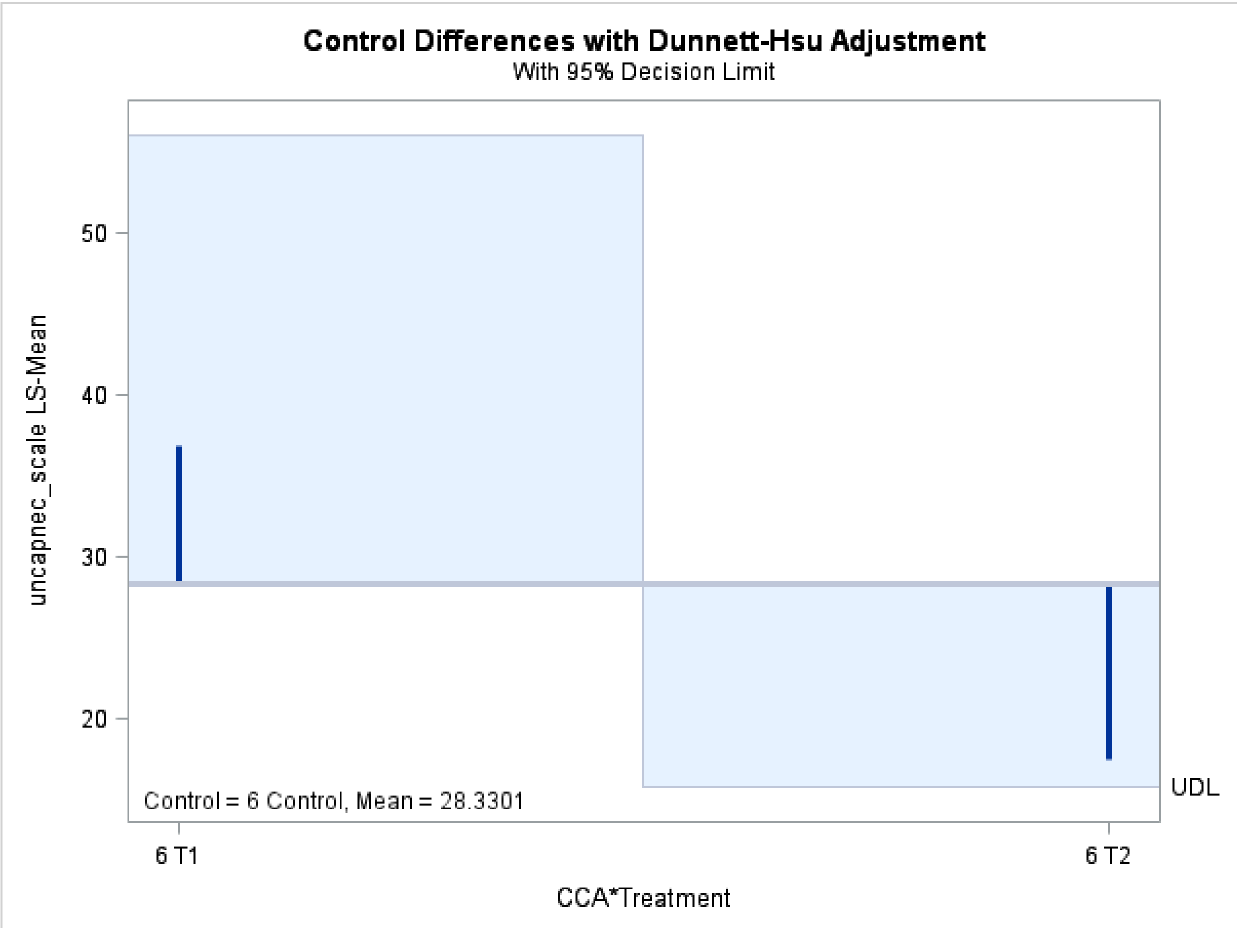


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	16.57	6.90	0.0066

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	-8.6148	5.3779	16.64	-1.60	0.9360	0.9871
CCA 6	**Control**	**T2**	10.8488	4.6717	16.38	2.32	0.0167	0.0221

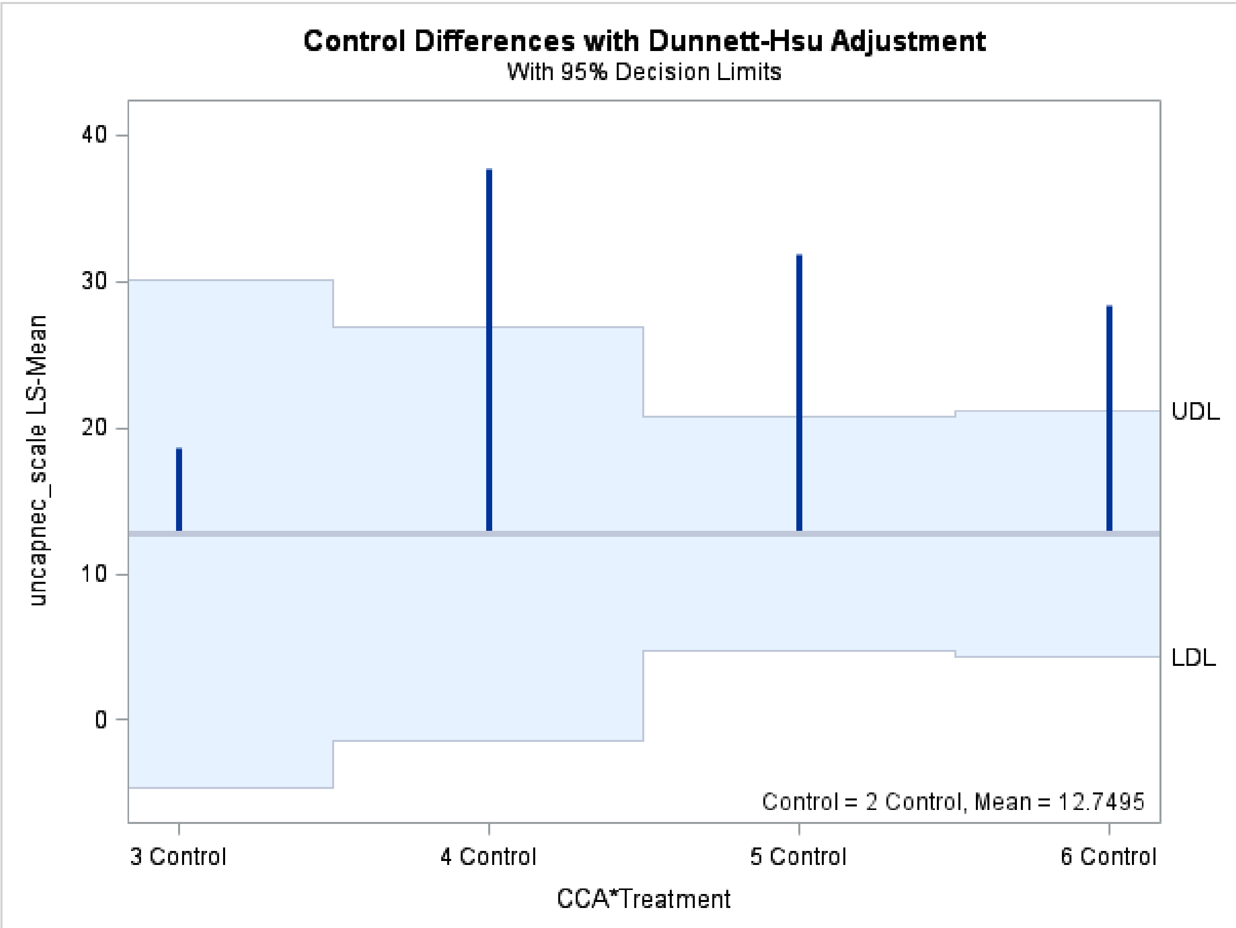


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	41.71	14.30	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	5.9125	6.8154	27.18	0.87	0.3933	0.8468
Treatment Control	**4**	**2**	25.0045	5.5269	29.24	4.52	<.0001	0.0001
Treatment Control	**5**	**2**	19.1064	3.1401	35.3	6.08	<.0001	<.0001
Treatment Control	**6**	**2**	15.5806	3.3037	21.16	4.72	0.0001	<.0001

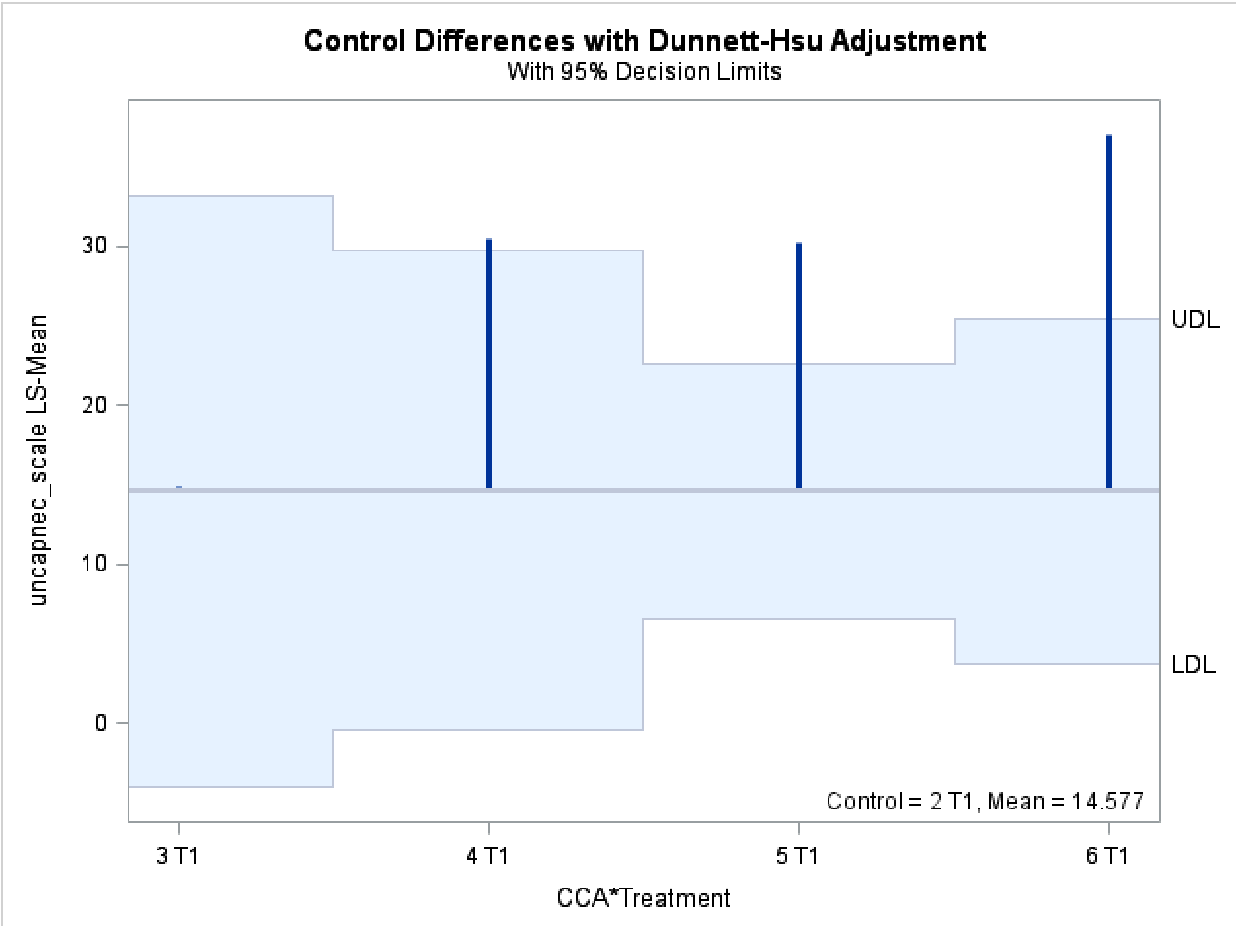


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	33.65	11.80	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	0.3005	7.2854	27.25	0.04	0.9674	1.0000
Treatment T1	**4**	**2**	15.8947	5.9083	29.18	2.69	0.0117	0.0351
Treatment T1	**5**	**2**	15.6062	3.1541	35.51	4.95	<.0001	<.0001
Treatment T1	**6**	**2**	22.3678	4.2419	19.27	5.27	<.0001	<.0001

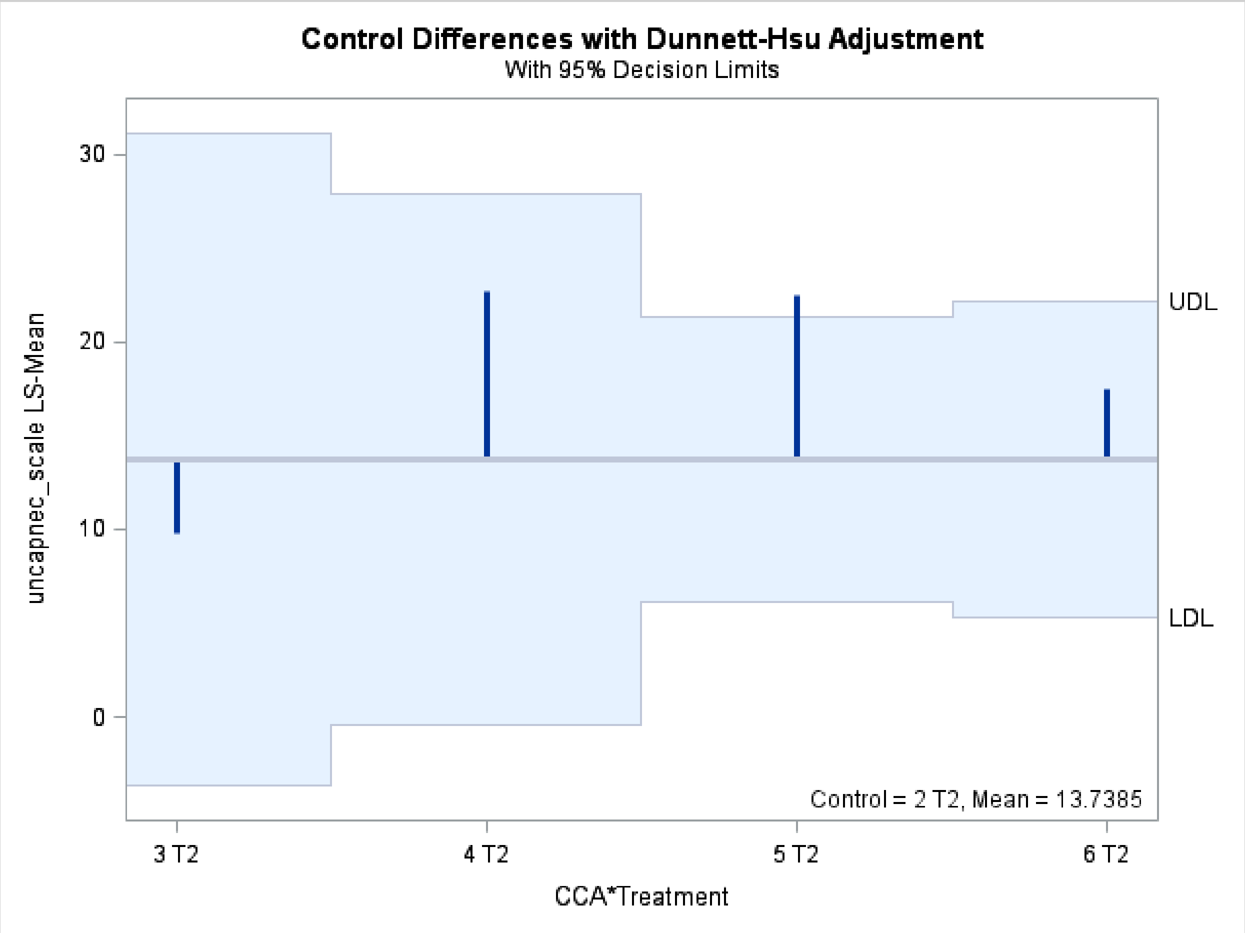


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	39.98	2.96	0.0313

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	-3.9775	6.8154	27.18	-0.58	0.5643	0.9580
Treatment T2	**4**	**2**	8.9225	5.5269	29.24	1.61	0.1172	0.3598
Treatment T2	**5**	**2**	8.7720	2.9673	36.26	2.96	0.0054	0.0170
Treatment T2	**6**	**2**	3.7427	3.2995	21.15	1.13	0.2694	0.6810

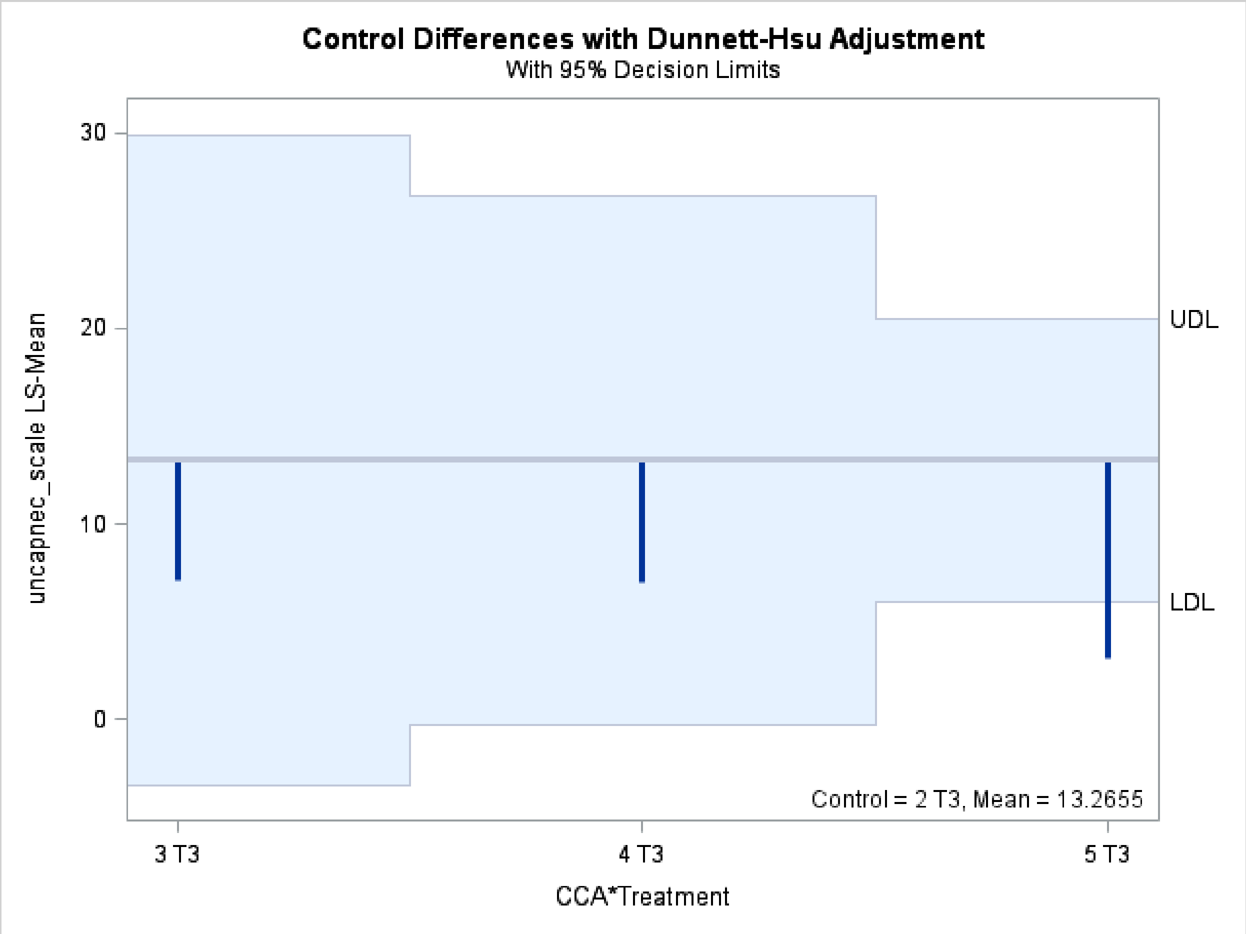


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	37.68	3.96	0.0150

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-6.1490	6.8154	27.18	-0.90	0.3749	0.7383
Treatment T3	**4**	**2**	-6.2135	5.5269	29.24	-1.12	0.2701	0.5892
Treatment T3	**5**	**2**	-10.1480	2.9673	36.26	-3.42	0.0016	0.0033



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	12.7495	1.7711	19.6	7.20	<.0001	0.05	9.0500	16.4490
CCA*Treatment	**T1**	**2**	14.5770	1.7711	19.6	8.23	<.0001	0.05	10.8775	18.2765
CCA*Treatment	**T2**	**2**	13.7385	1.7711	19.6	7.76	<.0001	0.05	10.0390	17.4380
CCA*Treatment	**T3**	**2**	13.2655	1.7711	19.6	7.49	<.0001	0.05	9.5660	16.9650
CCA*Treatment	**Control**	**3**	18.6620	7.0999	25.8	2.63	0.0143	0.05	4.0615	33.2625
CCA*Treatment	**T1**	**3**	14.8775	7.5523	26.1	1.97	0.0595	0.05	-0.6432	30.3982
CCA*Treatment	**T2**	**3**	9.7610	7.0999	25.8	1.37	0.1810	0.05	-4.8395	24.3615
CCA*Treatment	**T3**	**3**	7.1165	7.0999	25.8	1.00	0.3255	0.05	-7.4840	21.7170

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**4**	37.7540	5.7653	26.8	6.55	<.0001	0.05	25.9211	49.5869
CCA*Treatment	**T1**	**4**	30.4717	6.1319	27.2	4.97	<.0001	0.05	17.8942	43.0492
CCA*Treatment	**T2**	**4**	22.6610	5.7653	26.8	3.93	0.0005	0.05	10.8281	34.4939
CCA*Treatment	**T3**	**4**	7.0520	5.7653	26.8	1.22	0.2319	0.05	-4.7809	18.8849
CCA*Treatment	**Control**	**5**	31.8559	3.1454	28.5	10.13	<.0001	0.05	25.4176	38.2942
CCA*Treatment	**T1**	**5**	30.1832	3.1593	28.3	9.55	<.0001	0.05	23.7147	36.6517
CCA*Treatment	**T2**	**5**	22.5105	2.9728	27.9	7.57	<.0001	0.05	16.4200	28.6010
CCA*Treatment	**T3**	**5**	3.1175	2.9728	27.9	1.05	0.3033	0.05	-2.9730	9.2080
CCA*Treatment	**Control**	**6**	28.3301	3.3345	16.7	8.50	<.0001	0.05	21.2867	35.3735
CCA*Treatment	**T1**	**6**	36.9448	4.2659	17.1	8.66	<.0001	0.05	27.9490	45.9406
CCA*Treatment	**T2**	**6**	17.4812	3.3303	16.7	5.25	<.0001	0.05	10.4469	24.5156

clothi pollen patty trt - CFS data analysis (CCA2-6 (no T3 for CCA6)
Dunnett's tests - total honey_scale

The Mixed Procedure

Model Information

Data Set	WORK.CCA2_6
Dependent Variable	tothoney_scale
Covariance Structures	Variance Components, Heterogeneous Compound Symmetry
Subject Effect	Treatme*hive(Apiary)
Estimation Method	REML
Residual Variance Method	None
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Satterthwaite

Class Level Information

Class	Levels	Values
Apiary	4	A B C D
CCA	5	2 3 4 5 6
Treatment	4	Control T1 T2 T3
hive	32	A1 A2 A3 A4 A5 A6 A7 A8 B1 B2 B3 B4 B5 B6 B7 B8 C1 C2 C3 C4 C5 C6 C7 C8 D1 D2 D3 D4 D5 D6 D7 D8

Dimensions

Covariance Parameters	7
Columns in X	29
Columns in Z	4
Subjects	1
Max Obs per Subject	142

Number of Observations

Number of Observations Read	152
Number of Observations Used	142

Number of Observations

Number of Observations Not Used	10

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	1064.48748170	
1	2	1025.19486413	0.00053161
2	1	1024.95854038	0.00002141
3	1	1024.94972720	0.00000005
4	1	1024.94970780	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate
Apiary		33.6982
Var(1)	**Treatme*hive(Apiary)**	96.6539
Var(2)	**Treatme*hive(Apiary)**	405.84
Var(3)	**Treatme*hive(Apiary)**	272.81
Var(4)	**Treatme*hive(Apiary)**	127.70
Var(5)	**Treatme*hive(Apiary)**	275.97
CSH	**Treatme*hive(Apiary)**	0.3439

Fit Statistics

-2 Res Log Likelihood	1024.9
AIC (Smaller is Better)	1038.9
AICC (Smaller is Better)	1039.9
BIC (Smaller is Better)	1034.7

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	F Value	Pr > F
Treatment	3	25.3	3.49	0.0302

Type 3 Tests of Fixed Effects

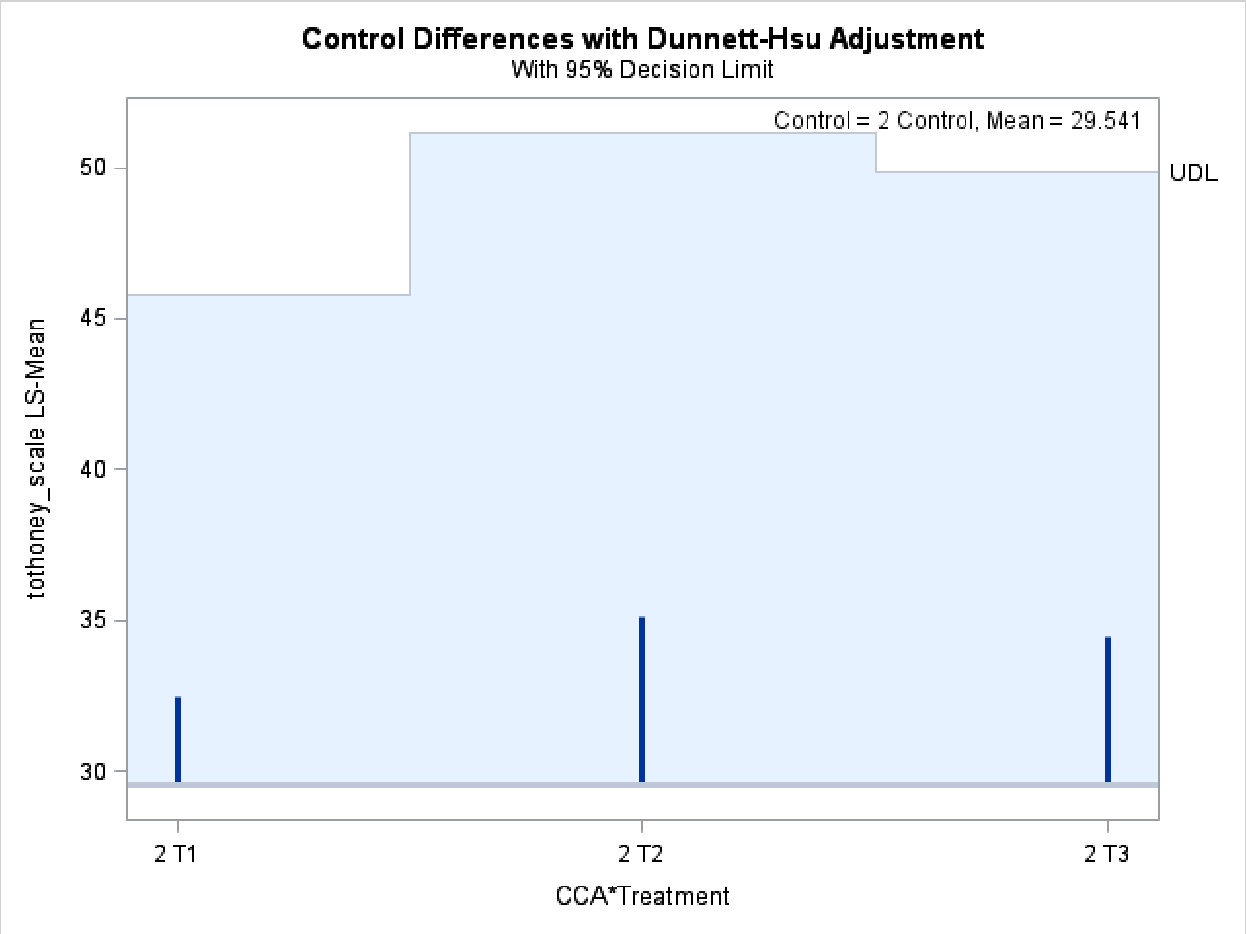
Effect	Num DF	Den DF	F Value	Pr > F
CCA	4	32	5.54	0.0017
CCA*Treatment	11	42.8	5.55	<.0001

F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 2	3	23.68	0.52	0.6701

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 2	**Control**	**T1**	-2.9025	4.9156	23.68	-0.59	0.7198	0.9109
CCA 2	**Control**	**T2**	-5.5900	4.9156	23.68	-1.14	0.8666	0.9750
CCA 2	**Control**	**T3**	-4.9450	4.9156	23.68	-1.01	0.8377	0.9651

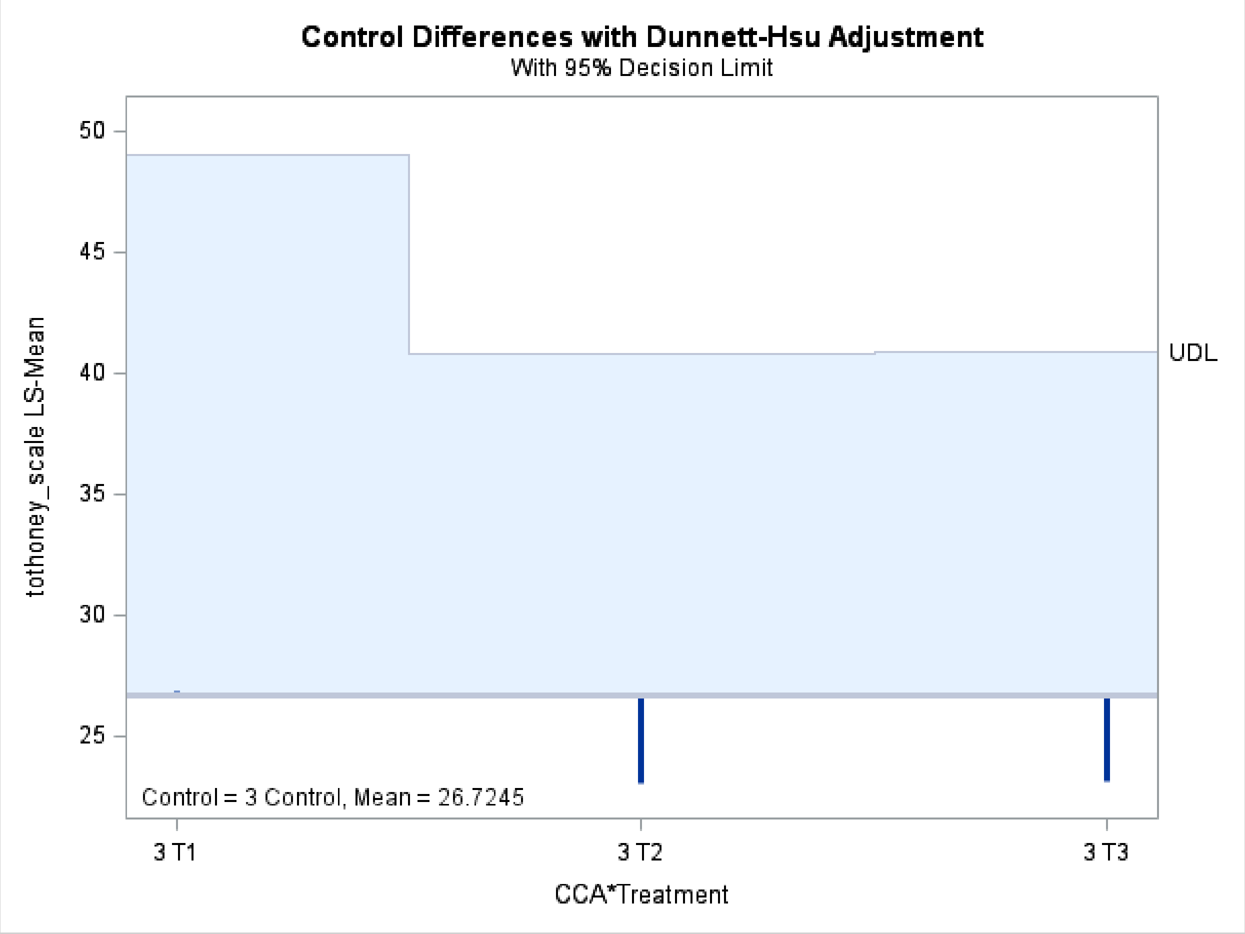


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 3	3	24.68	0.09	0.9663

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 3	**Control**	**T1**	-0.1136	10.3855	24.84	-0.01	0.5043	0.7567
CCA 3	**Control**	**T2**	3.6765	10.0727	24.53	0.36	0.3591	0.6053
CCA 3	**Control**	**T3**	3.6120	10.0727	24.53	0.36	0.3615	0.6081

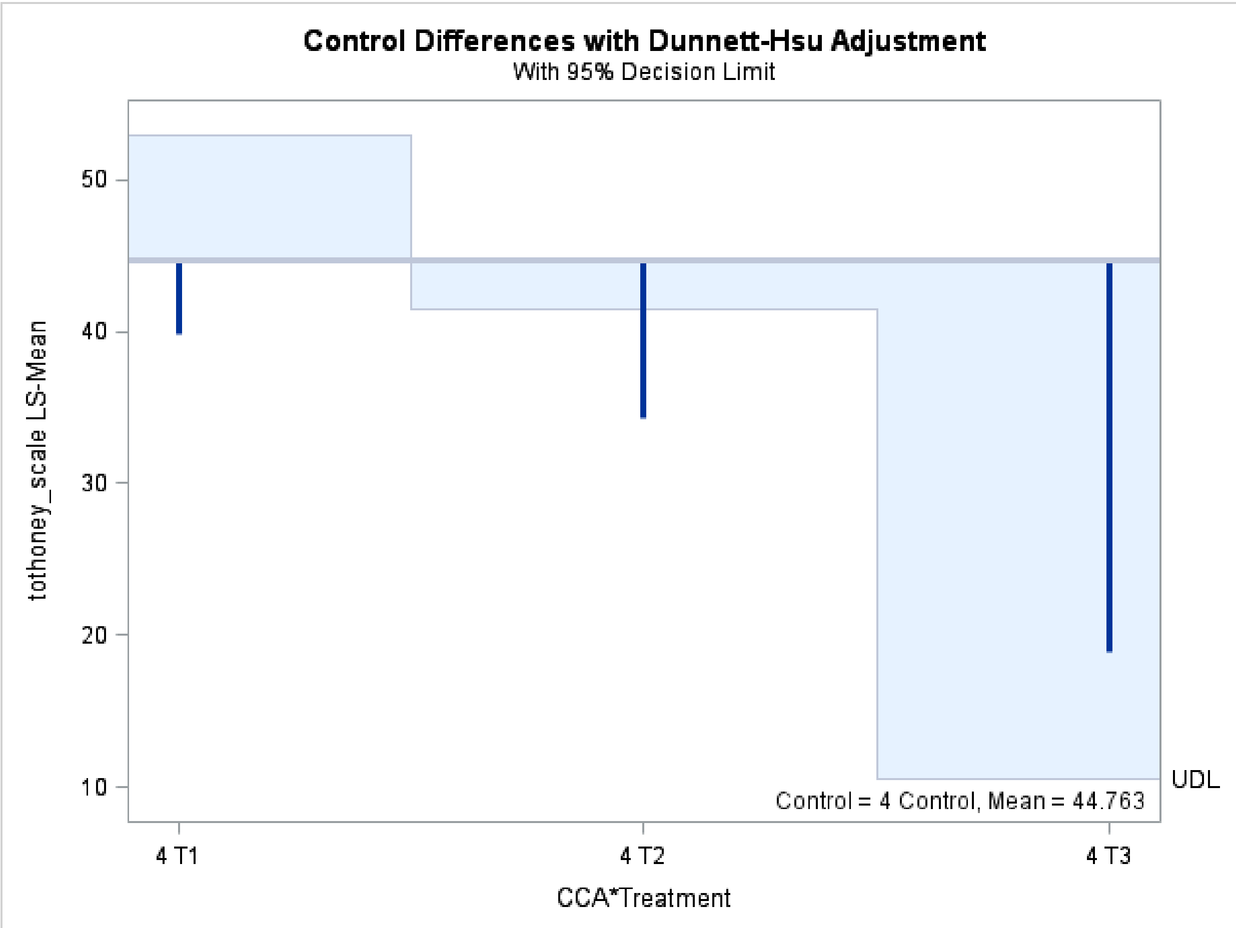


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 4	3	27.04	3.66	0.0247

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 4	**Control**	**T1**	4.9486	8.5157	27.21	0.58	0.2830	0.5089
CCA 4	**Control**	**T2**	10.4275	8.2584	26.88	1.26	0.1088	0.2311
CCA 4	**Control**	**T3**	25.8860	8.2584	26.88	3.13	0.0021	0.0043

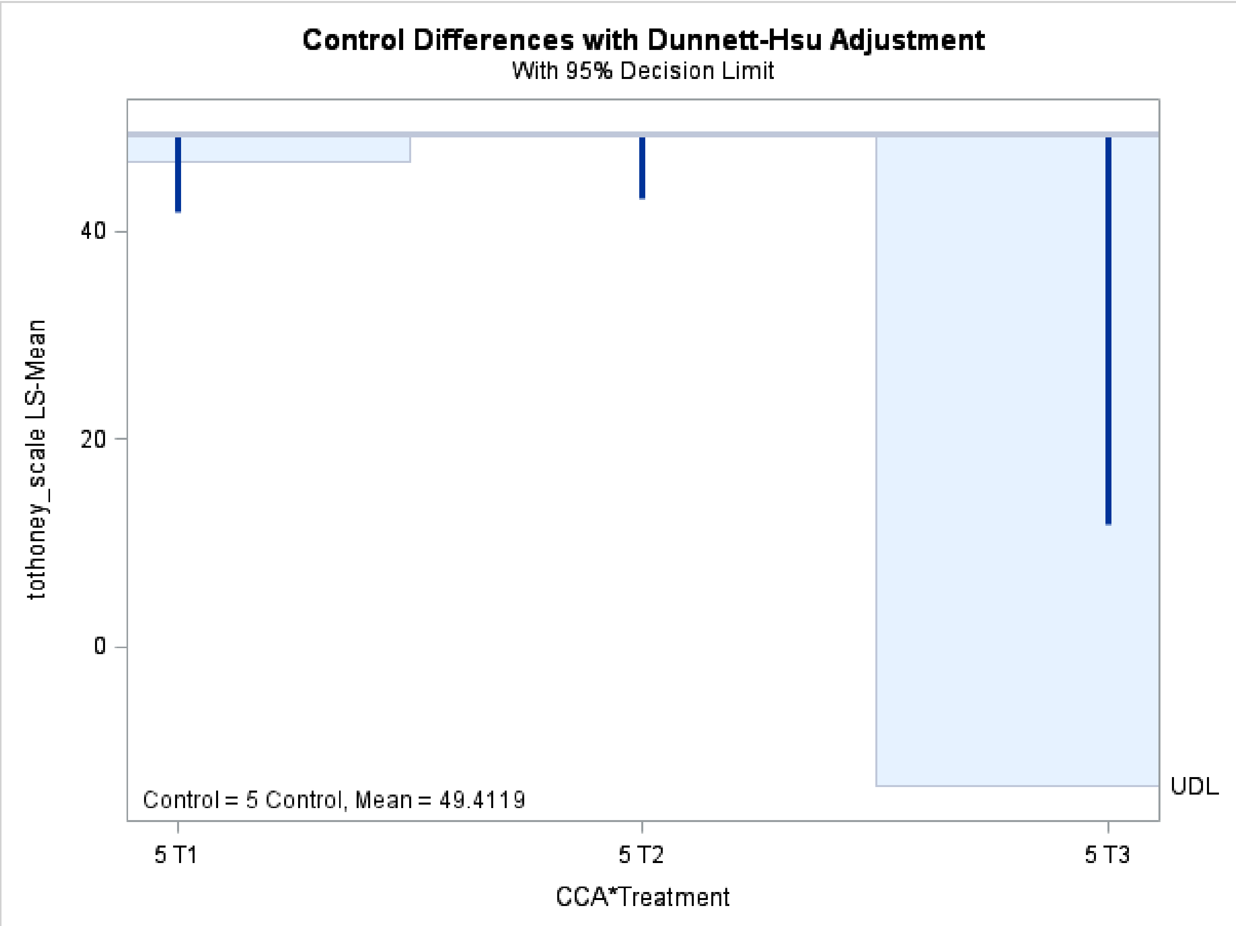


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 5	3	27.94	17.23	<.0001

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 5	**Control**	**T1**	7.6236	5.9858	28.41	1.27	0.1066	0.2239
CCA 5	**Control**	**T2**	6.2184	5.8099	28.01	1.07	0.1468	0.2954
CCA 5	**Control**	**T3**	37.5439	5.8099	28.01	6.46	<.0001	<.0001

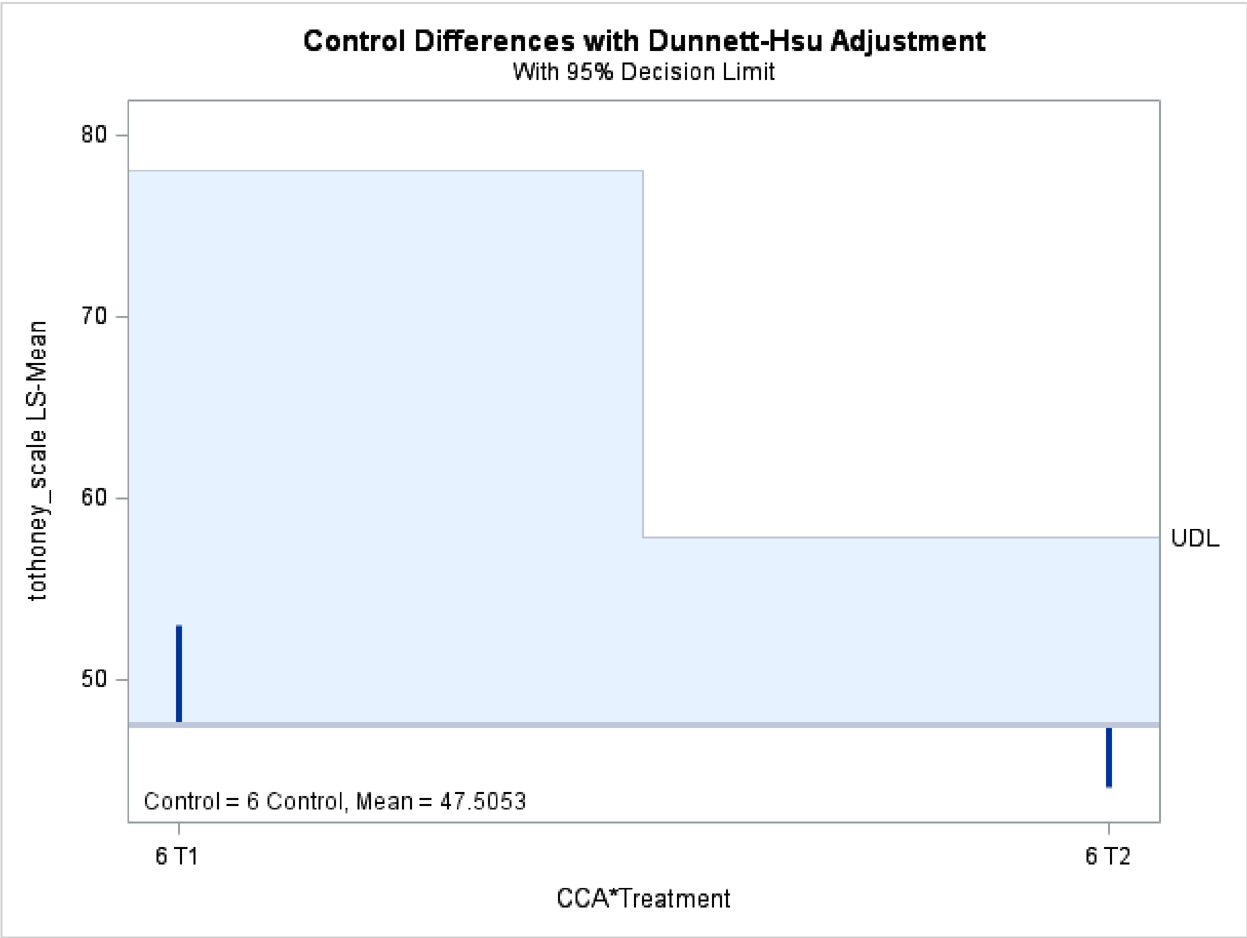


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
CCA 6	2	17.25	0.40	0.6782

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	Treatment	_Treatment	Estimate	Standard Error	DF	t Value	Pr > t	Adj P
CCA 6	**Control**	**T1**	-5.4173	9.9990	17.39	-0.54	0.7026	0.8556
CCA 6	**Control**	**T2**	3.4900	8.7568	16.92	0.40	0.3476	0.5088

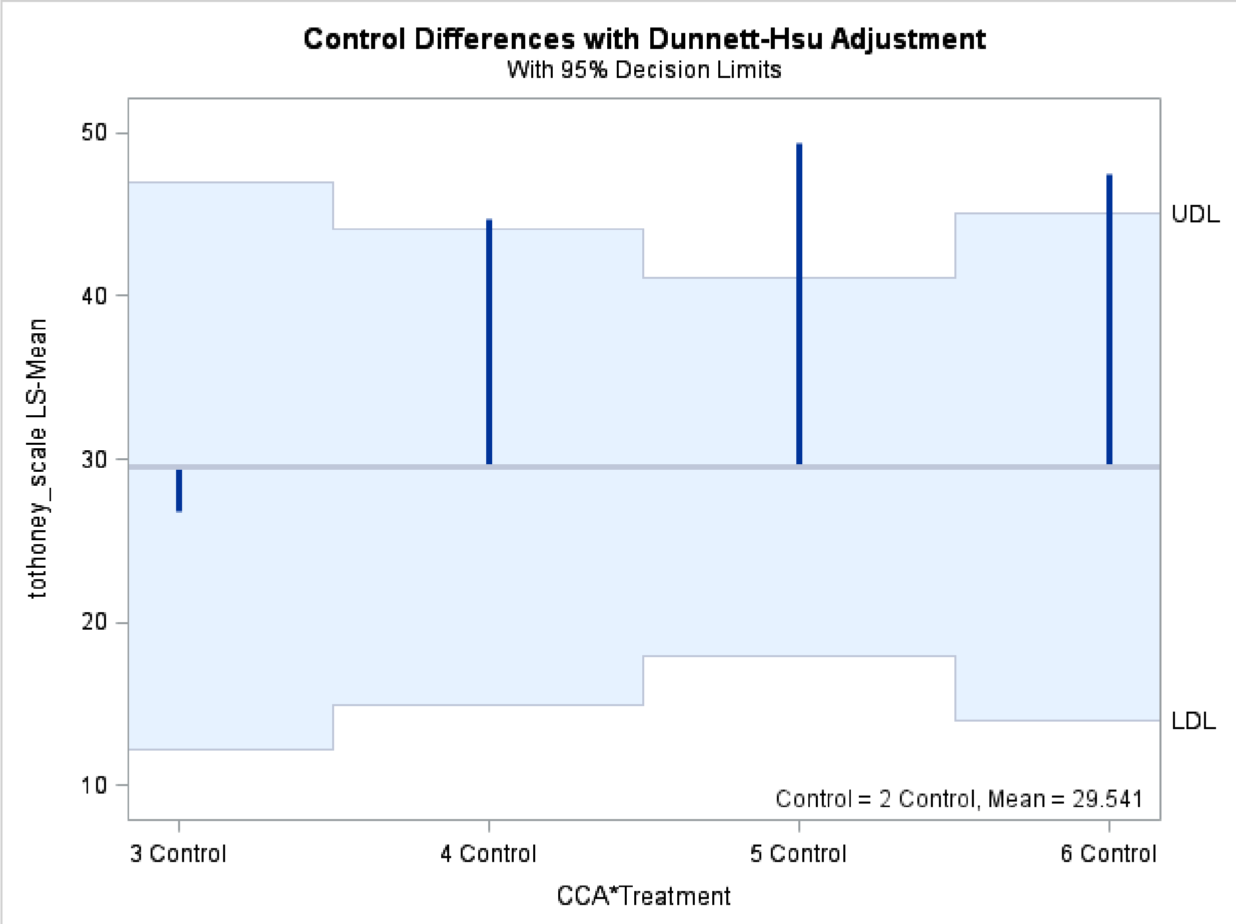


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment Control	4	56.11	7.10	0.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment Control	**3**	**2**	-2.8165	6.7665	32.94	-0.42	0.6799	0.9865
Treatment Control	**4**	**2**	15.2220	5.6766	38.37	2.68	0.0107	0.0386
Treatment Control	**5**	**2**	19.8709	4.5082	46.74	4.41	<.0001	0.0003
Treatment Control	**6**	**2**	17.9643	6.0365	22.48	2.98	0.0069	0.0182

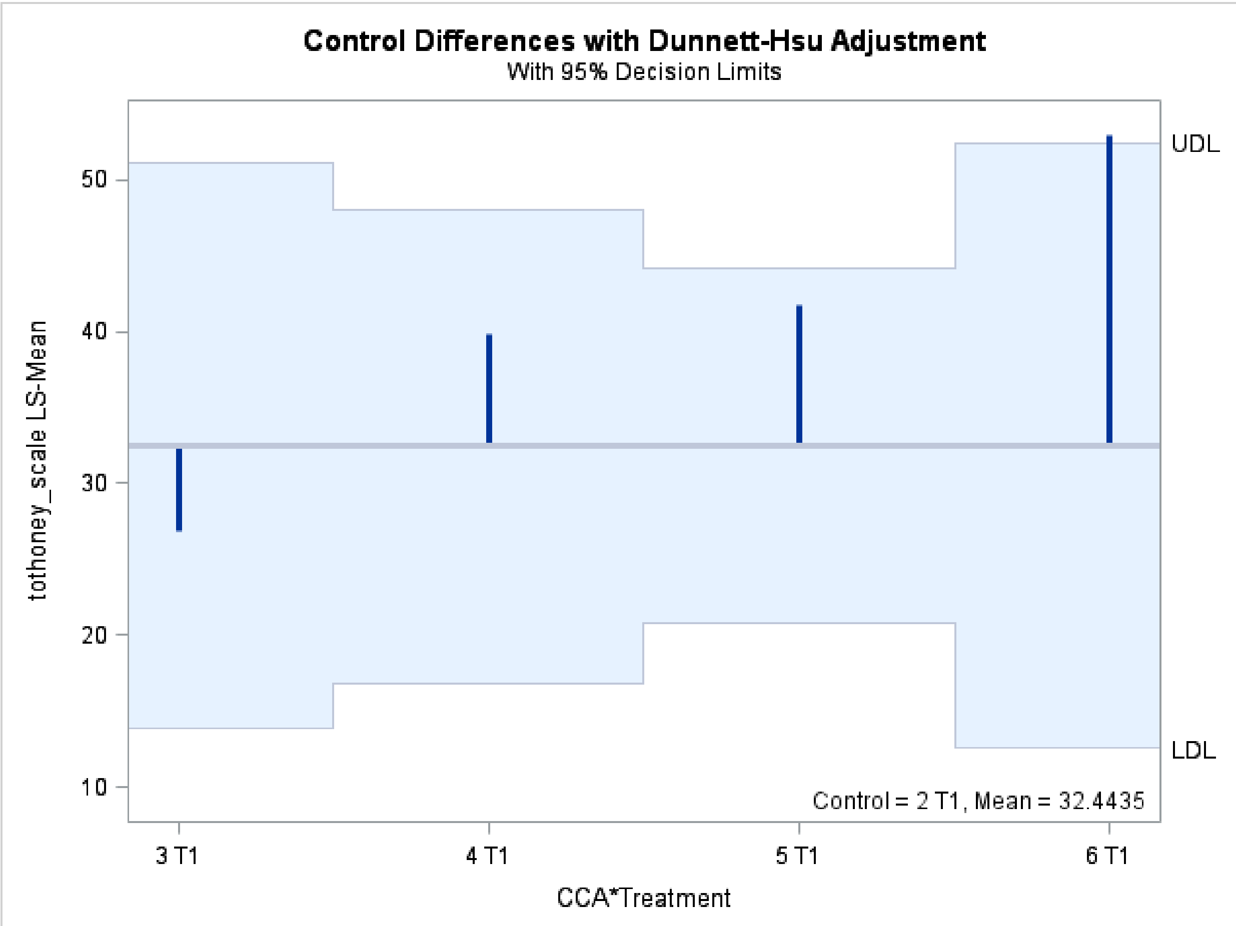


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T1	4	54.63	3.15	0.0212

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T1	**3**	**2**	-5.6054	7.2240	32.39	-0.78	0.4434	0.8857
Treatment T1	**4**	**2**	7.3709	6.0448	37.55	1.22	0.2303	0.6142
Treatment T1	**5**	**2**	9.3448	4.5327	47.26	2.06	0.0448	0.1579
Treatment T1	**6**	**2**	20.4792	7.7228	20.41	2.65	0.0151	0.0418

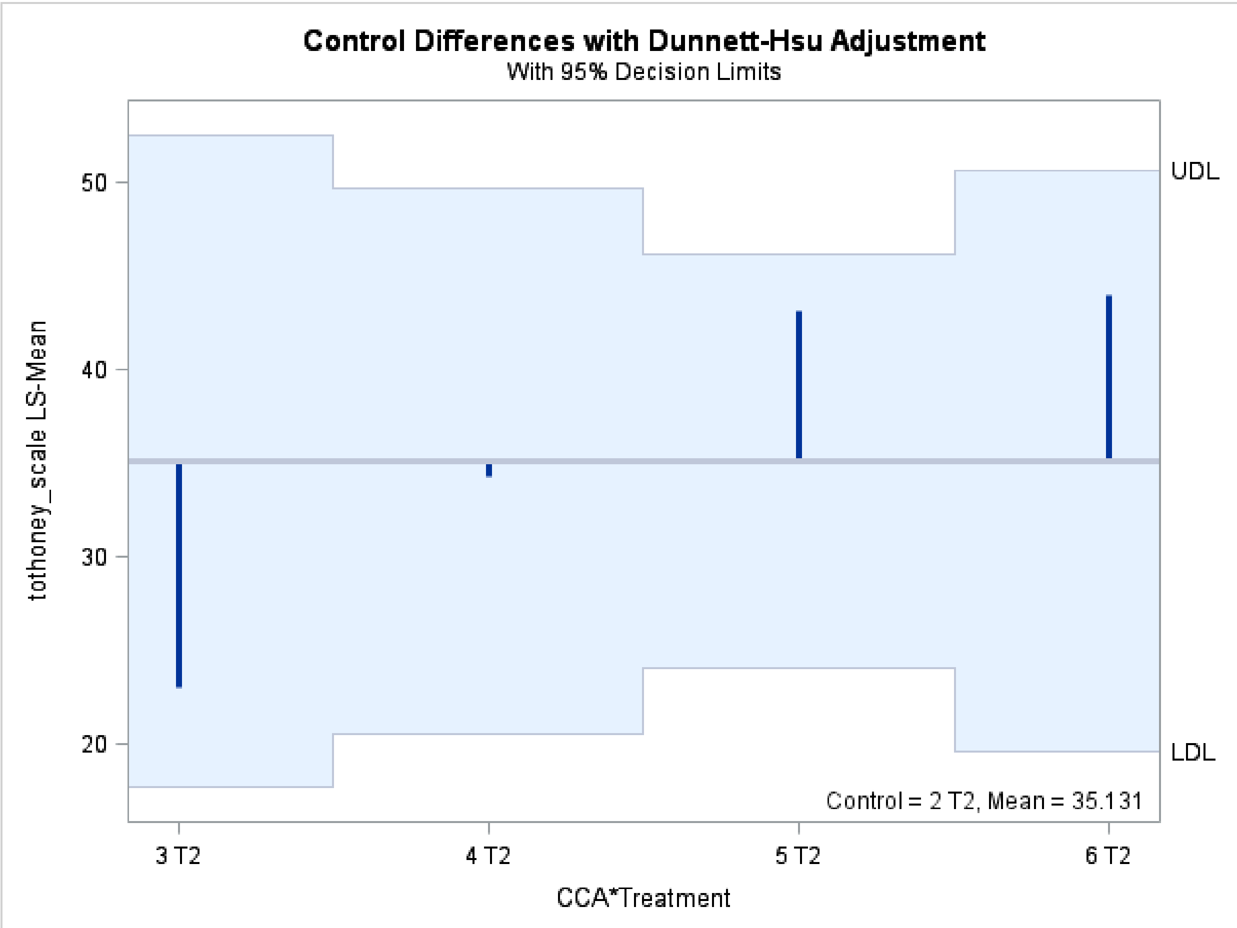


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T2	4	56.75	2.96	0.0272

Simple Differences of CCA*Treatment Least Squares Means
Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T2	**3**	**2**	-12.0830	6.7665	32.94	-1.79	0.0834	0.2642
Treatment T2	**4**	**2**	-0.7955	5.6766	38.37	-0.14	0.8893	0.9998
Treatment T2	**5**	**2**	8.0625	4.3005	47.26	1.87	0.0670	0.2247
Treatment T2	**6**	**2**	8.8843	6.0268	22.46	1.47	0.1543	0.4376

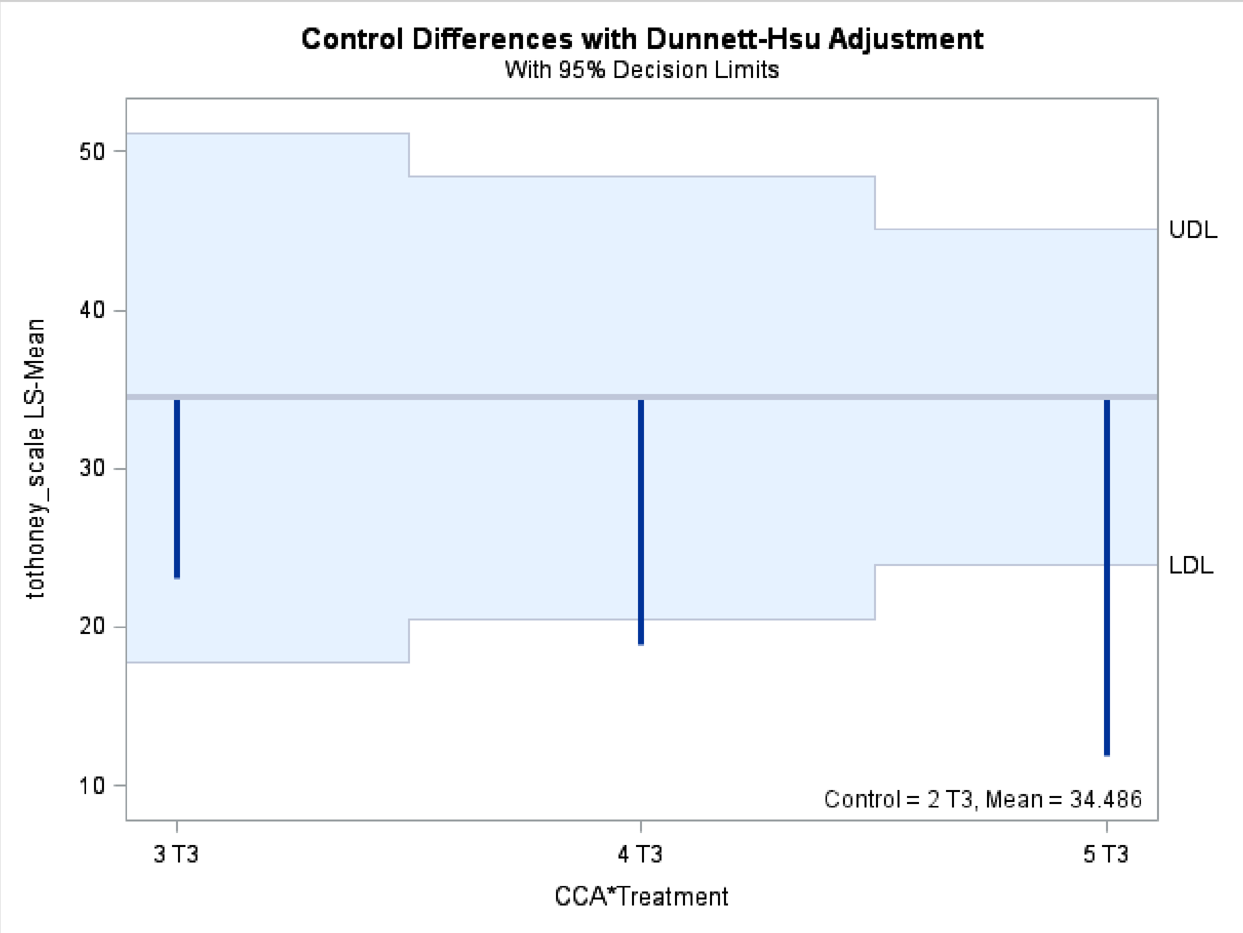


F Test for CCA*Treatment Least Squares Means Slice

Slice	Num DF	Den DF	F Value	Pr > F
Treatment T3	3	62.86	9.56	<.0001

Simple Differences of CCA*Treatment Least Squares Means Adjustment for Multiple Comparisons: Dunnett-Hsu

Slice	CCA	_CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Adj P
Treatment T3	**3**	**2**	-11.3735	6.7665	32.94	-1.68	0.1023	0.2544
Treatment T3	**4**	**2**	-15.6090	5.6766	38.37	-2.75	0.0090	0.0249
Treatment T3	**5**	**2**	-22.6180	4.3005	47.26	-5.26	<.0001	<.0001



Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**2**	29.5410	4.5284	9.99	6.52	<.0001	0.05	19.4501	39.6319
CCA*Treatment	**T1**	**2**	32.4435	4.5284	9.99	7.16	<.0001	0.05	22.3526	42.5344
CCA*Treatment	**T2**	**2**	35.1310	4.5284	9.99	7.76	<.0001	0.05	25.0401	45.2219
CCA*Treatment	**T3**	**2**	34.4860	4.5284	9.99	7.62	<.0001	0.05	24.3951	44.5769
CCA*Treatment	**Control**	**3**	26.7245	7.6912	23.8	3.47	0.0020	0.05	10.8443	42.6047
CCA*Treatment	**T1**	**3**	26.8381	8.0966	25	3.31	0.0028	0.05	10.1619	43.5144
CCA*Treatment	**T2**	**3**	23.0480	7.6912	23.8	3.00	0.0063	0.05	7.1678	38.9282
CCA*Treatment	**T3**	**3**	23.1125	7.6912	23.8	3.01	0.0062	0.05	7.2323	38.9927

Least Squares Means

Effect	Treatment	CCA	Estimate	Standard Error	DF	t Value	Pr > |t|	Alpha	Lower	Upper
CCA*Treatment	**Control**	**4**	44.7630	6.5211	20.6	6.86	<.0001	0.05	31.1872	58.3388
CCA*Treatment	**T1**	**4**	39.8144	6.8440	22.3	5.82	<.0001	0.05	25.6300	53.9987
CCA*Treatment	**T2**	**4**	34.3355	6.5211	20.6	5.27	<.0001	0.05	20.7597	47.9113
CCA*Treatment	**T3**	**4**	18.8770	6.5211	20.6	2.89	0.0088	0.05	5.3012	32.4528
CCA*Treatment	**Control**	**5**	49.4119	5.1203	13.9	9.65	<.0001	0.05	38.4227	60.4010
CCA*Treatment	**T1**	**5**	41.7883	5.1418	14	8.13	<.0001	0.05	30.7625	52.8141
CCA*Treatment	**T2**	**5**	43.1935	4.9383	12.5	8.75	<.0001	0.05	32.4786	53.9084
CCA*Treatment	**T3**	**5**	11.8680	4.9383	12.5	2.40	0.0326	0.05	1.1531	22.5829
CCA*Treatment	**Control**	**6**	47.5053	6.8427	16.8	6.94	<.0001	0.05	33.0530	61.9577
CCA*Treatment	**T1**	**6**	52.9227	8.3680	18.8	6.32	<.0001	0.05	35.3968	70.4485
CCA*Treatment	**T2**	**6**	44.0153	6.8341	16.7	6.44	<.0001	0.05	29.5802	58.4505