

# Efficacy Evaluation of Red Quinoa

FORMOSA RUBY™ DRINK STUDY

## *Principal Investigator:*

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## *Objective:*

The aim of this study was to evaluate the efficacy of Formosa Red Quinoa (Formosa Ruby™) drink via scientific validation.

## *IRB:*

The study was approved by Antai Medical Care Corporation  
Antai-Tian-Sheng Memorial Hospital Institutional Review Board TSMH IRB No. 17-095-A.

## *Reference:*

TCI Co., Ltd. EVE laboratory 2022.

## *Abstract*

A total of 30 subjects were recruited in the trial. The subjects were informed to consume one bottle of drink after meals in the morning every day for 8 weeks. Skin condition of the subjects was measured on week 0, 4, and 8 of the trial. The blood samples were collected on week 0 and 8 of the trial. After 8 weeks of Red Quinoa (Formosa Ruby™) drink consumption skin moisture was significantly increased by 13.9% ( $p < 0.001$ ), skin brightening significantly improved/increased by 3.8% ( $p < 0.001$ ), texture improved, crow's feet depth significantly decreased by 21.5% ( $p < 0.001$ ), and skin collagen density was significantly increased by 41.9%.

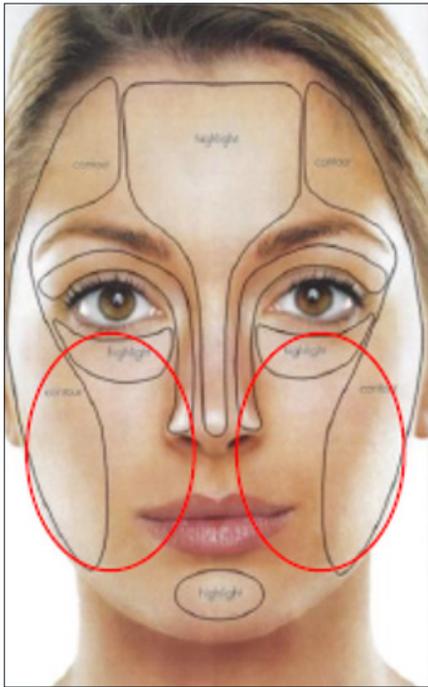
During the trial, there was no skin irritation or any other discomfort reported by the subjects.

## *Material and Method*

A total of 30 healthy subjects aged 30-55 years old volunteered in this randomized, double-blind, placebo-controlled study. Subjects were informed to consume either a placebo drink or a 5g Red Quinoa (Formosa Ruby™) drink every day after a morning meal for 8 weeks. Skin condition of the subjects was measured at 0, 4, and 8 weeks of the trial.

Before measurements, subjects were instructed to wash and wipe their face and acclimatize for at least 30 minutes to the standardized laboratory conditions. The skin condition measures included skin moisture (Corneometer CM825, C+K, Germany), skin color - L\* value (Chroma Meter; MM-500, Minolta, Japan), skin texture (VISIA Complexion Analysis, Canfield Scientific Inc, USA), crow's feet depth (Soft Plus, Callegari 1930, Italy), and collagen density (DermaLab® Series SkinLab Combo; Cortex, Denmark), tests were performed at 0, 4, and 8 weeks (measuring position is shown in Figure 1).

Blood samples were collected on week 0 and 8 of the study to evaluate the blood antioxidant marker catalase (CAT) level before and after consuming drink.



### Study Design and Results

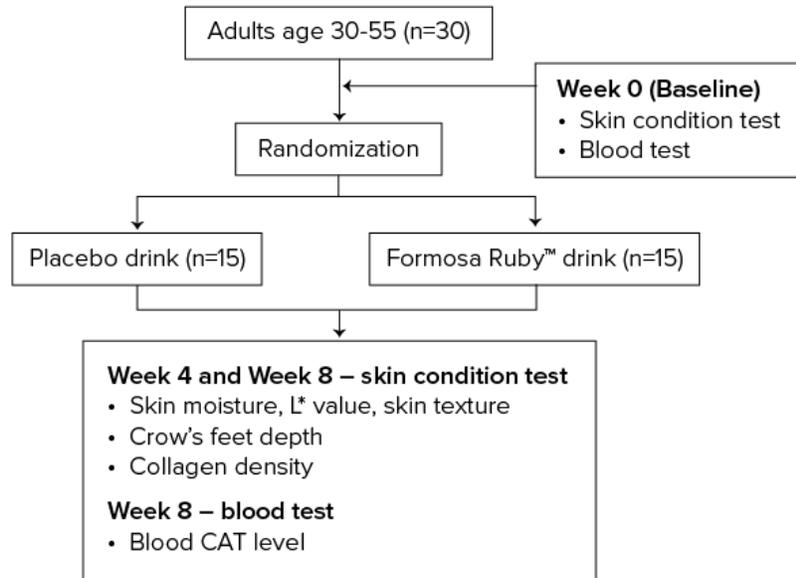


Figure 1. Skin measurement positions

#### 1. Skin moisture efficacy

After consuming Red Quinoa (Formosa Ruby™) drink for 4 weeks, skin moisture was significantly increased 9.3% (\*\*,  $p < 0.01$ ). After consuming Red Quinoa (Formosa Ruby™) drink for 8 weeks, skin moisture was significantly increased 13.9% (\*\*\*,  $p < 0.001$ ) (Figure 2). The ratio of the subjects who had an effective improvement to the total participants was 93% on week 4 and week 8, respectively.

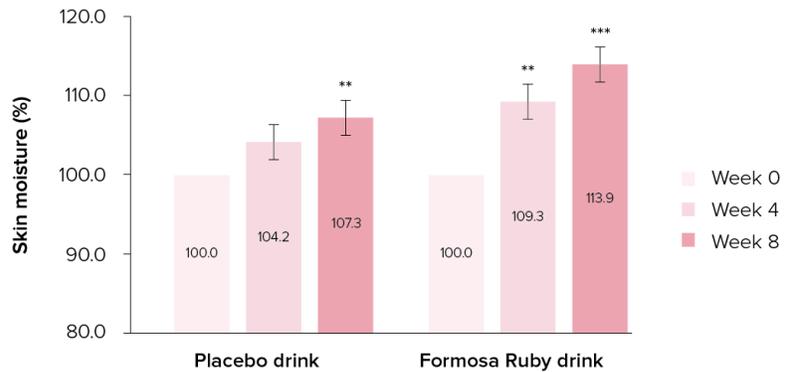
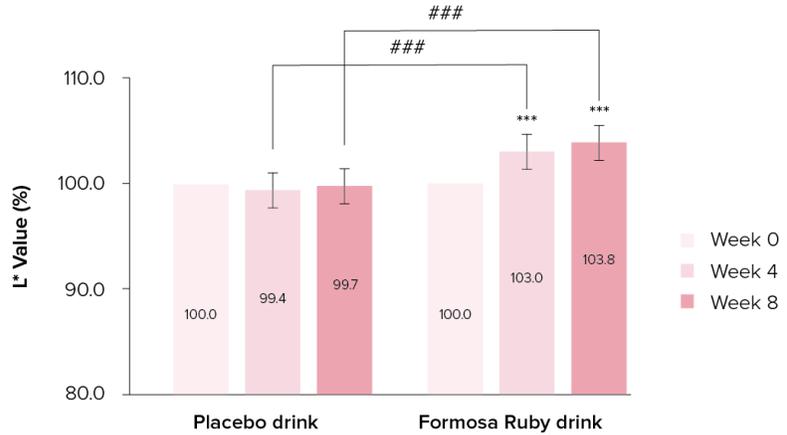


Figure 2. Skin moisture of subjects before and after 8 weeks of supplementation with Red Quinoa (Formosa Ruby™). (Significant difference to week 0: \*\* $p < 0.01$ ; \*\*\*  $p < 0.001$ ).

**2. Skin brightening efficacy**

Figure 3 shows that the skin tone (L\* value-brightness) was significantly increased 3.0% (\*\* p < 0.001; ### p < 0.001) after consuming Red Quinoa (Formosa Ruby™) drink for 4 weeks. Skin brightness (L\* value) was significantly increased 3.8% (\*\* p < 0.001; ### p < 0.001) after consuming Red Quinoa (Formosa Ruby™) drink for 8 weeks. The ratio of the subjects who had an effective improvement to the total participants was 93% on week 4 and 100% on week 8, respectively. In addition, there was a significant difference between Red Quinoa (Formosa Ruby™) drink and placebo drink at 4 and 8 weeks.

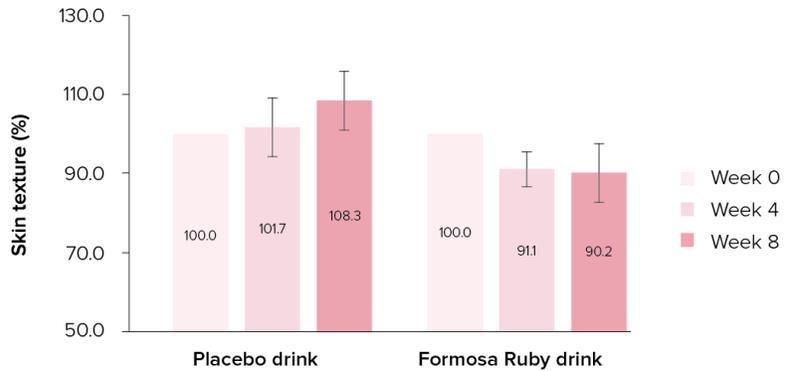
**Figure 3.** L\* value of subjects before and after 8-week consumption of Red Quinoa (Formosa Ruby™). (Significant difference versus Week 0: \*\*, p < 0.001; significant difference versus placebo drink: ###, p < 0.001).



**3. Texture improvement efficacy**

After consuming Red Quinoa (Formosa Ruby™) drink, skin texture was improved 8.9% at 4 weeks and 9.8% at 8 weeks (Figures 4A and B). The ratio of the subjects who had an effective improvement to the total participants was 80% on week 4 and 73% on week 8, respectively.

**Figure 4A.** Skin texture of subjects before and after 8-week consumption of Red Quinoa (Formosa Ruby™). There was no significant difference at week 8 but a trend in improvement with the Red Quinoa (Formosa Ruby™) drink as compared to placebo and Week 0.



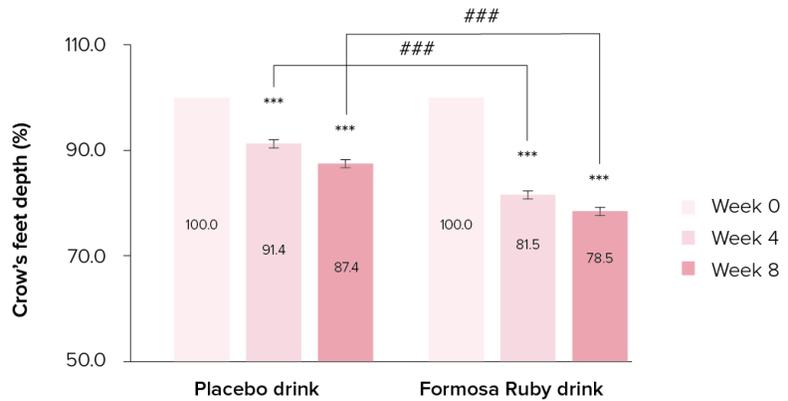
**Figure 4B.** Representative photograph after consuming Red Quinoa (Formosa Ruby™) drink for 8 weeks on skin texture of subjects before and after the trial.



**4. Crow’s feet elimination efficacy**

Figure 5 shows that crow’s feet depth was significantly decreased 18.5% (\*\*\*,  $p < 0.001$ ; ###,  $p < 0.001$ ) after consuming Red Quinoa (Formosa Ruby™) drink for 4 weeks. Crow’s feet depth was significantly decreased 21.5% (\*\*\*,  $p < 0.001$ ; ###,  $p < 0.001$ ) after consuming Red Quinoa (Formosa Ruby™) drink for 8 weeks. The ratio of the subjects who had an effective improvement to the total participants was 100%.

**Figure 5A.** Crow’s feet depth of subjects before and after 8-week consumption of Red Quinoa (Formosa Ruby™). There was a significant improvement after 4 weeks of 18.5% which increased to 21.5% after 8 weeks. (\*\*\*,  $p < 0.001$ ; ###  $p < 0.001$ ).



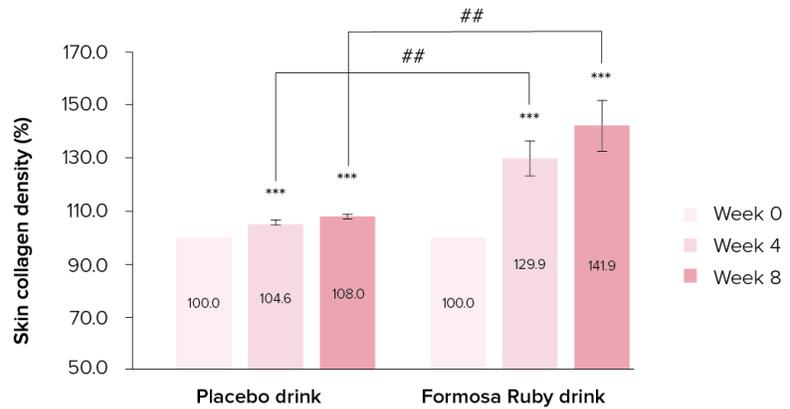
**Figure 5B.** Crow’s feet depth of subjects before and after the trial. Representative photograph after consuming Red Quinoa (Formosa Ruby™) drink for 8 weeks. (Significant difference versus week 0: \*\*\*,  $p < 0.001$ ; significant difference versus placebo drink: ###,  $p < 0.001$ ).



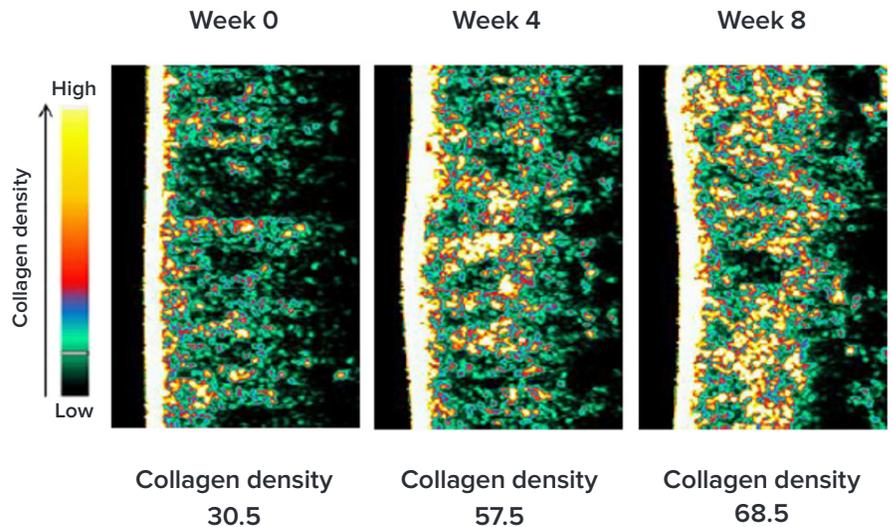
5. Collagen boosting efficacy

After consuming Red Quinoa (Formosa Ruby™) drink for 4 weeks, skin collagen density was significantly increased 29.9% (\*\*,  $p < 0.001$ ; ##,  $p < 0.01$ ). After consuming Red Quinoa (Formosa Ruby™) drink for 8 weeks, skin collagen density was significantly increased 41.9% (\*\*,  $p < 0.001$ ; ##,  $p < 0.01$ ) (Figure 6A). The ratio of the subjects who had an effective improvement to the total participants was 100%. In the ultrasound image, the brighter the color, the higher the collagen density. Figure 6B shows that the bright spots were significantly increased after 8 weeks of consumption.

**Figure 6A.** Skin collagen density significantly increased 29.9% after consuming Red Quinoa (Formosa Ruby™) drink for 4 weeks, which further increased significantly to 41.9% after 8 weeks. (\*\*,  $p < 0.001$ ; ##,  $p < 0.01$ ).



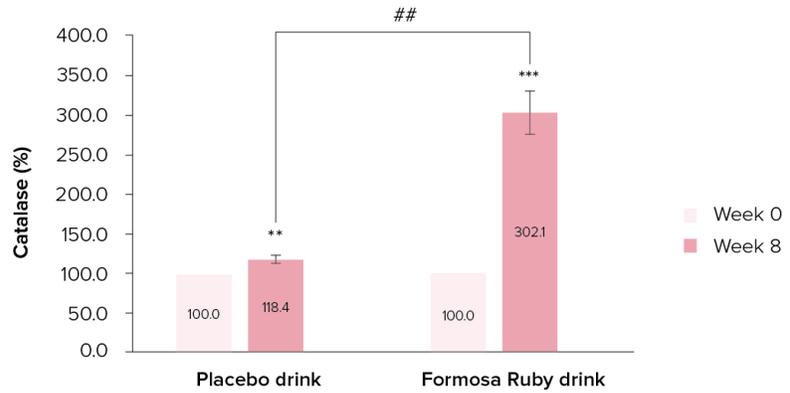
**Figure 6B.** Skin collagen density of subjects before and after the trial. Representative photograph after consuming the Red Quinoa (Formosa Ruby™) drink for 8 weeks. (Significant difference versus Week 0: \*\*,  $p < 0.001$ ; significant difference versus placebo drink: ##,  $p < 0.01$ ).



**6. Antioxidant effect**

After consuming Red Quinoa (Formosa Ruby™) drink for 8 weeks, blood catalase (CAT) level was significantly increased by 202.1% (\*\*\*,  $p < 0.001$ ; ##,  $p < 0.01$ ) (Figure 7). The ratio of the subjects who had an effective improvement to the total participants was 93%.

**Figure 7.** Blood CAT level of subjects before and after the trial. Representative graph after consuming the Red Quinoa (Formosa Ruby™) drink for 8 weeks. (Significant difference versus week 0: \*\*,  $p < 0.01$ , \*\*\*,  $p < 0.001$ ; significant difference versus placebo drink: ##,  $p < 0.01$ ).



## Results Summarized

**Table 1.** Summary of the improvement ratio after consuming the placebo drink and Red Quinoa (Formosa Ruby™) drink.

Improvement (%)	Placebo		Red Quinoa (Formosa Ruby™)	
	Week 4	Week 8	Week 4	Week 8
<b>Skin Care Efficacy</b>				
Skin moisture	+4.2%	+7.3%**	+9.3%**	+13.9**
L* value (brightness)	-0.6%	-0.3%	+3.0%***,###	+3.8%***,###
Skin texture (roughness)	+1.7%	+8.3%	-8.9%	-9.8%
Crow's feet depth	-8.6%***	-12.6%***	-18.5%***,###	-21.5%***,###
Collagen density	+4.6%***	+8.0%***	+29.9%***,###	+41.9%***,###
<b>Antioxidant Efficacy</b>				
Blood CAT levels		+18.4%**		+202.1%***,##

Significant difference versus Week 0: \*p < 0.05; \*\* p<0.01; \*\*\* p < 0.001

Significant difference versus placebo: # p < 0.05; ## p < 0.01; ### p < 0.001

## Conclusion

The study indicated the skin efficacy and anti-oxidation effect of Red Quinoa (Formosa Ruby™) drink. As a consequence, Red Quinoa (Formosa Ruby™) drink has the potential to increase skin moisture, skin brightness, improve skin texture, reduce crow's feet depth, promote collagen density, and enhance blood CAT level with antioxidant effect.