



SEPTEMBER 2018

CANNABIDIOL (CBD) AS A THERAPEUTIC MANAGEMENT OPTION FOR CANINE OSTEOARTHRITIS.



PANACEA

Life Sciences

Scientifically Driven. Medically Focused.



PANACEA LIFE SCIENCES

At Panacea, our mission is to develop medically relevant formulations from the hemp plant for treating various ailments.

We are dedicated to conducting clinical studies that provide improved and reliable information for hemp-based products that include dosing guidelines and efficacy for specific conditions.

INTRODUCTION

In this ongoing research study, we invited several veterinarians and voluntary canines (and their owners) to examine the effective use of our proprietary CANINE formulation containing **phytocannabinoid-rich hemp oil** (of which a key component is cannabidiol (**CBD**), and fish oil; on its ability to **reduce and manage inflammatory pain associated with osteoarthritis**. Each dog was identified by their primary care veterinarian as a potential candidate for this study. This study was **sponsored by Panacea Life Sciences, Inc. and led by Josh Sosnow, D.V.M.** Each primary care veterinarian helped to guide the participants through the process of evaluating the effectiveness of the product.



PROCEDURE AND PROTOCOL

Cannabidiol (**CBD**) has been reported to have **positive benefits** for treating/managing a range of disease conditions, (ie. osteoarthritis, anxiety, neurological and endocrine disease, and drug-resistant infections). We are evaluating CBD and our CBD based products in stages to determine how it can be **best utilized to improve the quality of life of humans and animals** with the aforementioned conditions; either as a sole agent or as an adjunct to more traditional therapies.

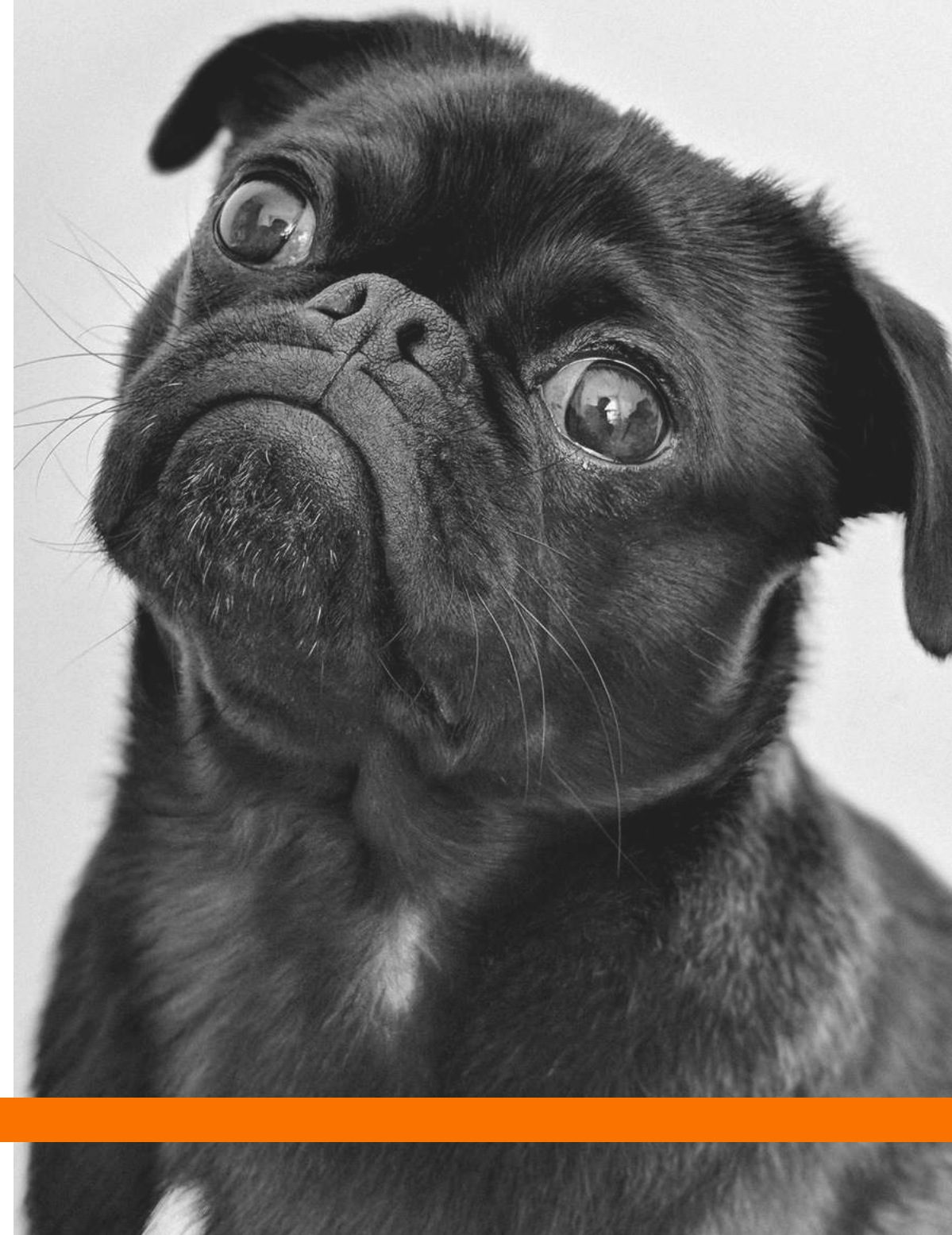
THE OBJECTIVE OF THE STUDY IS TO

- 1. Evaluate the efficacy of the CBD based, Panacea CANINE test product as an option for management of: pain, limited mobility or a diminished quality of life (secondary to osteoarthritis); using pet owner feedback from the Canine Brief Pain Inventory (BPI).**
- 2. Assess palatability, ease of administration and potential for side effects associated with administration of the Panacea CANINE test product.**

RESEARCH INTERVENTION

This research involves the dog owner **dosing their pet twice daily (10mg CBD total)** with Panacea Canine product as directed. Each owner was asked to complete a **weekly, online-assessment** through the course of the study; to determine benefits as described in the research protocol.

In addition, before and after videos were taken of each dog performing various movements.



PARTICIPANT SELECTION

For this ongoing study, we've been taking voluntary canines who have clinical evidence of osteoarthritis from 10-12 veterinary hospitals throughout the US. The majority of dogs enrolled did not receive treatment for their osteoarthritis through the course of the study unless otherwise noted. Participating dogs received the Panacea CANINE product at a **dose of 1 mg/5 kg of body weight twice daily, for 4 consecutive weeks**. Pet owners then completed the **University of Pennsylvania Canine Brief Pain Inventory (BPI)** to evaluate their dog's response; once a week, over the course of the study. To establish a baseline pain and movement level, owners were asked to evaluate their dog one week prior to administering the initial product treatment.

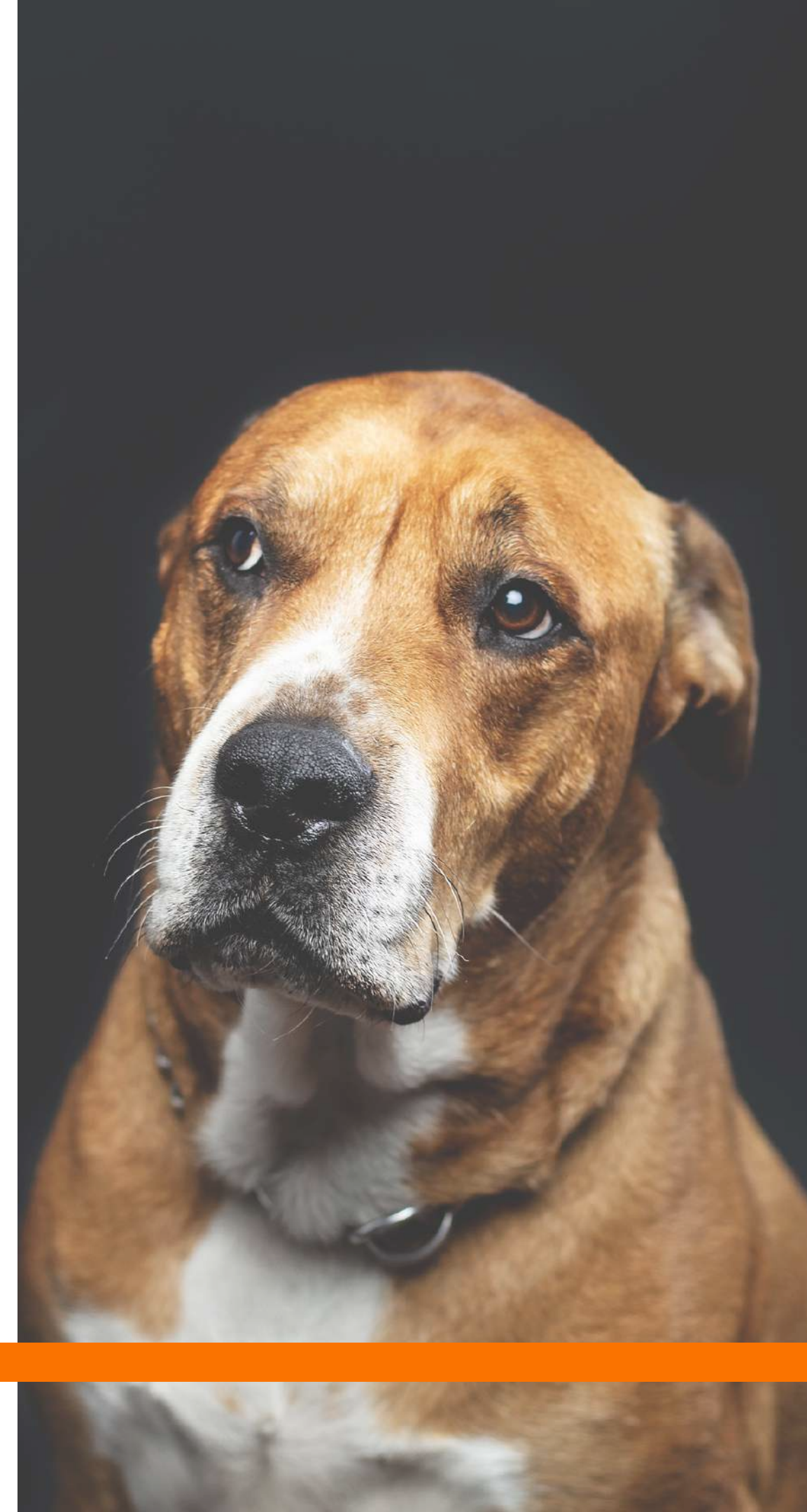
A black and white dog is running across a snowy field. In the background, there is a dense forest of trees under a cloudy sky. The image is split vertically, with the dog and field on the left and the text on the right.

DURATION DETAILS

Participation in this study requires that pet owners administer the test product **TWICE daily to their pet, for 4 consecutive weeks**. During the trial period we asked that dogs who are receiving other medications or therapies discontinue those in order to more accurately assess the efficacy of the Panacea CANINE test product. Since this study was observational and relied on systematized feedback from pet owners, no procedures are performed on any dog during the study period.

SURVEY ANALYSIS

After collecting the responses from all pet owner's (to date), the results were analyzed to examine the effectiveness of the Panacea CANINE product based on a **before** and **after** comparison. The analysis was based upon single factor analysis of variance to determine the statistical significance of the observed improvement for each of the pain-related measures included in the study. The results show that **all of the measures indicate improvement** and that 6 of the 10 measures were statistically significant at the **90% level or greater**.

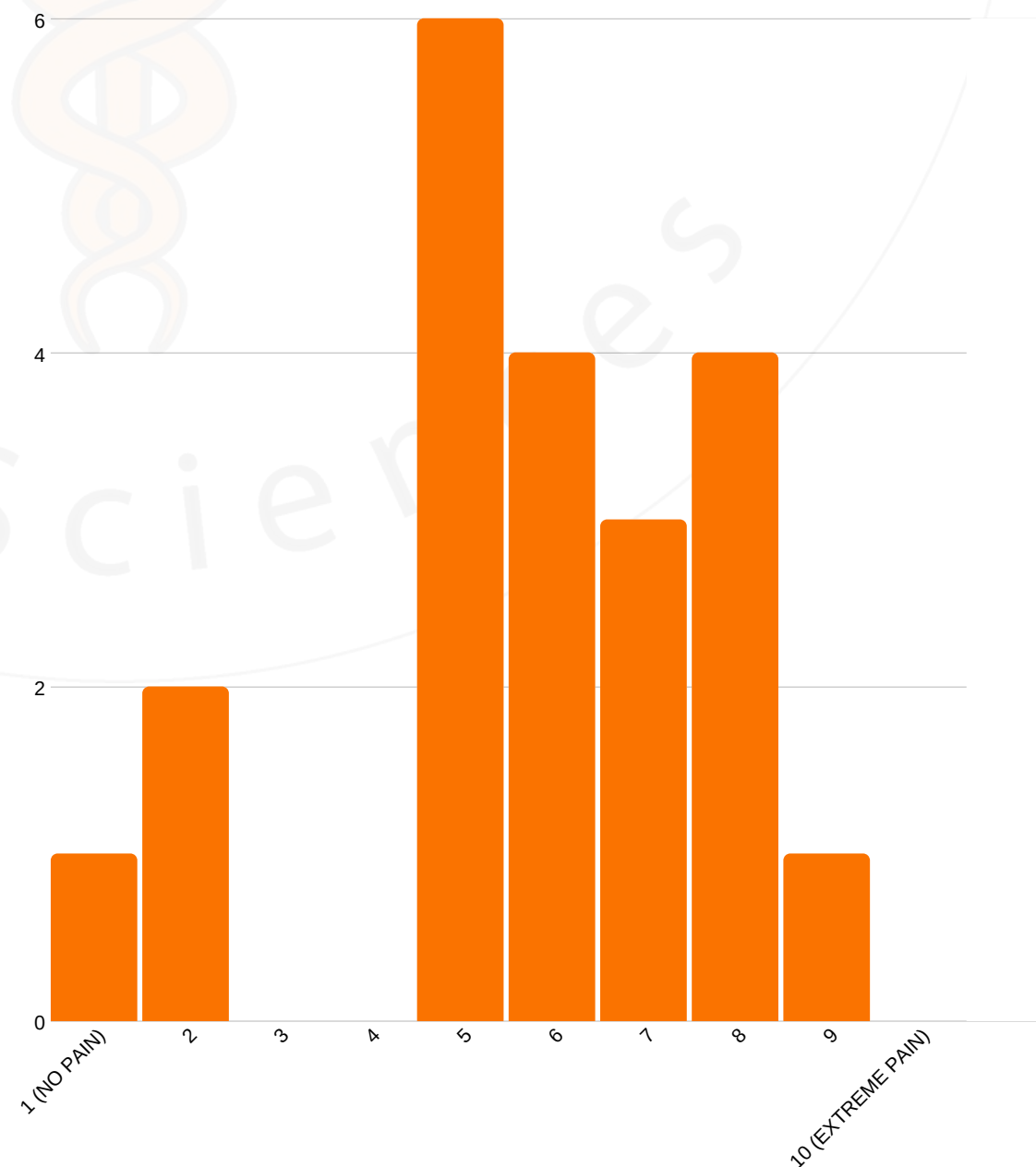


SURVEY SUMMARY

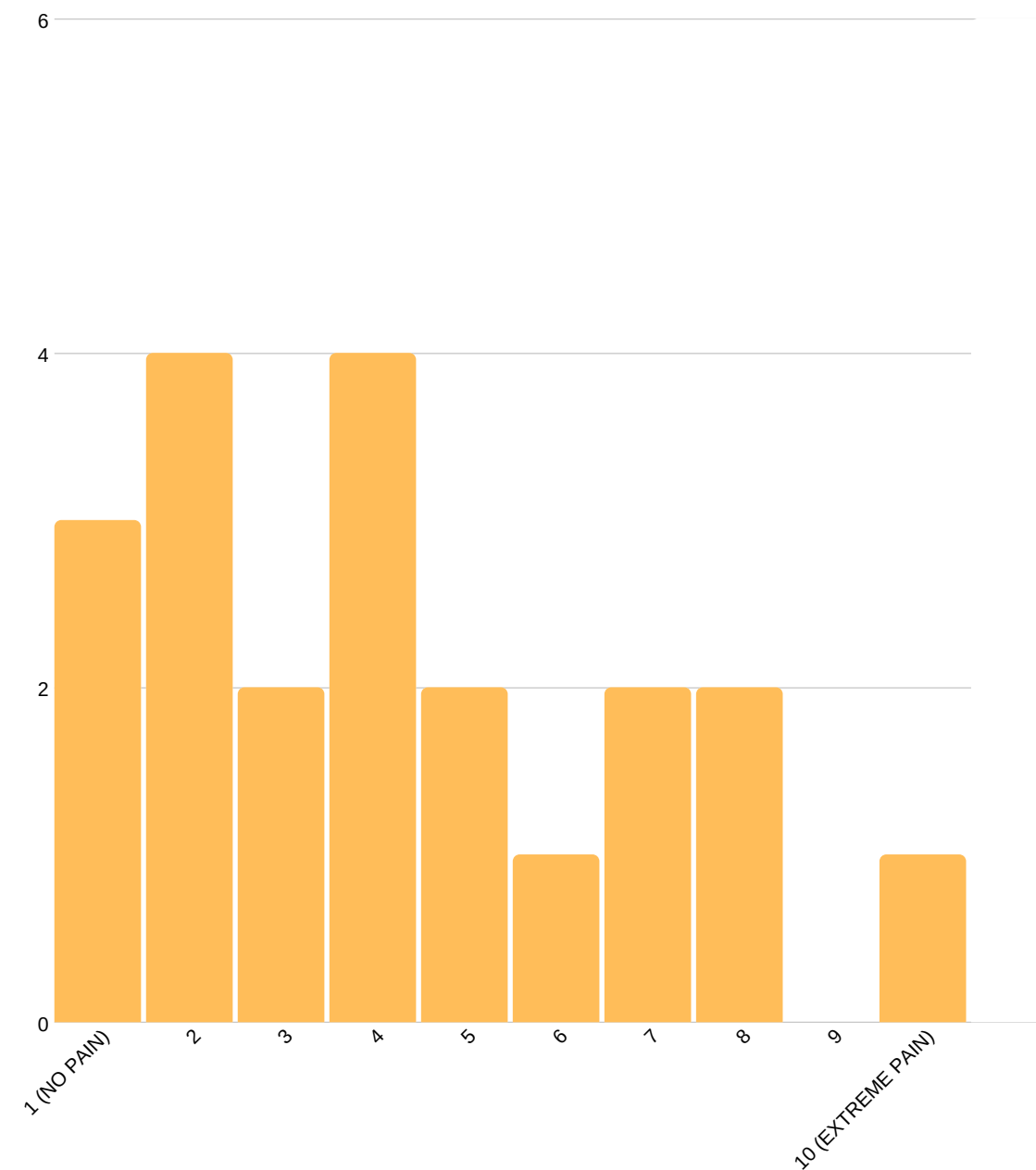
Question 1

Rate your dog's **worst** pain over the past 7 days.

BEFORE treatment



AFTER 30-day treatment.



Weighted Average

BEFORE 5.76

AFTER 4.24

26.4%
IMPROVEMENT

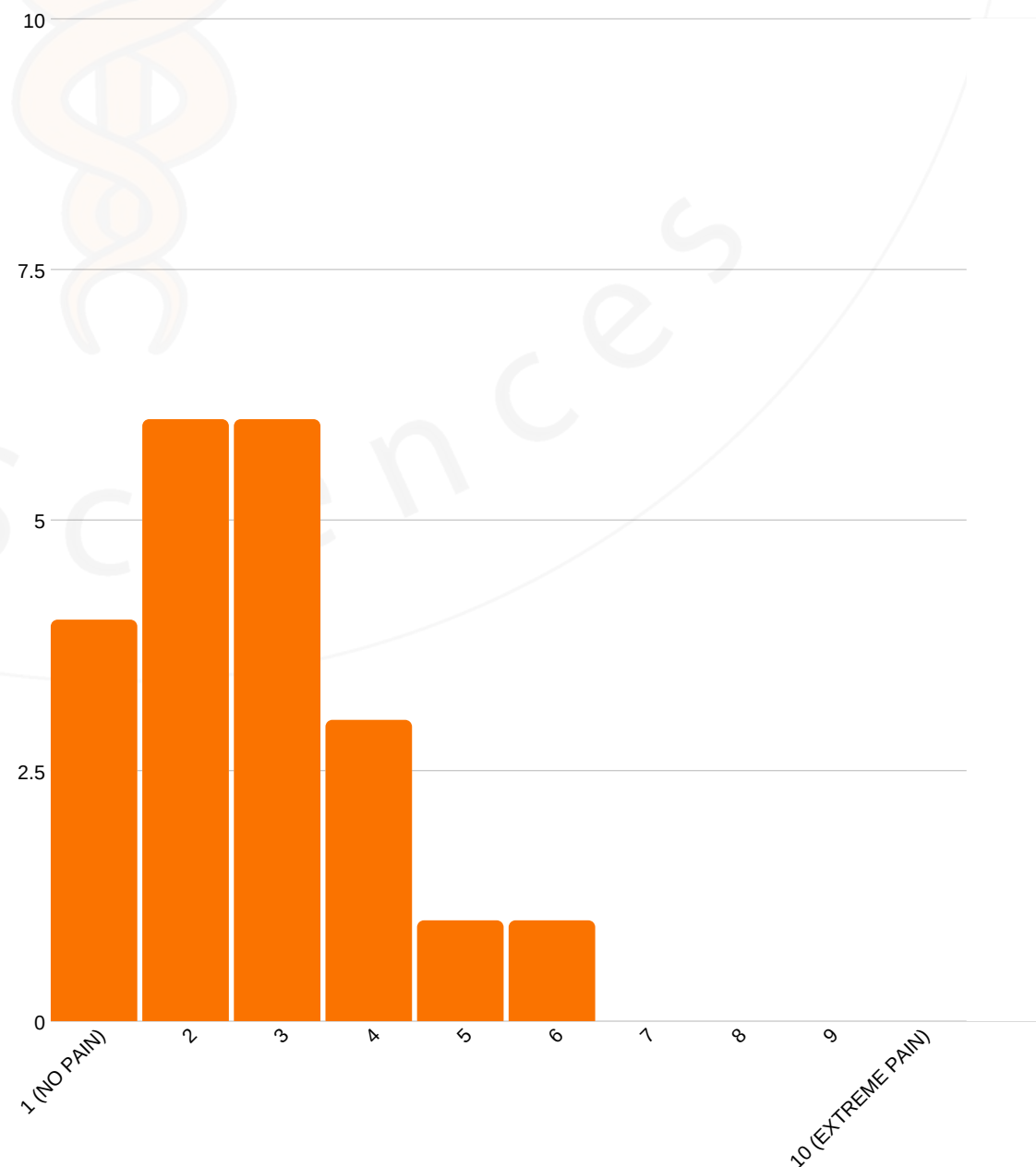
*significance .956

SURVEY SUMMARY

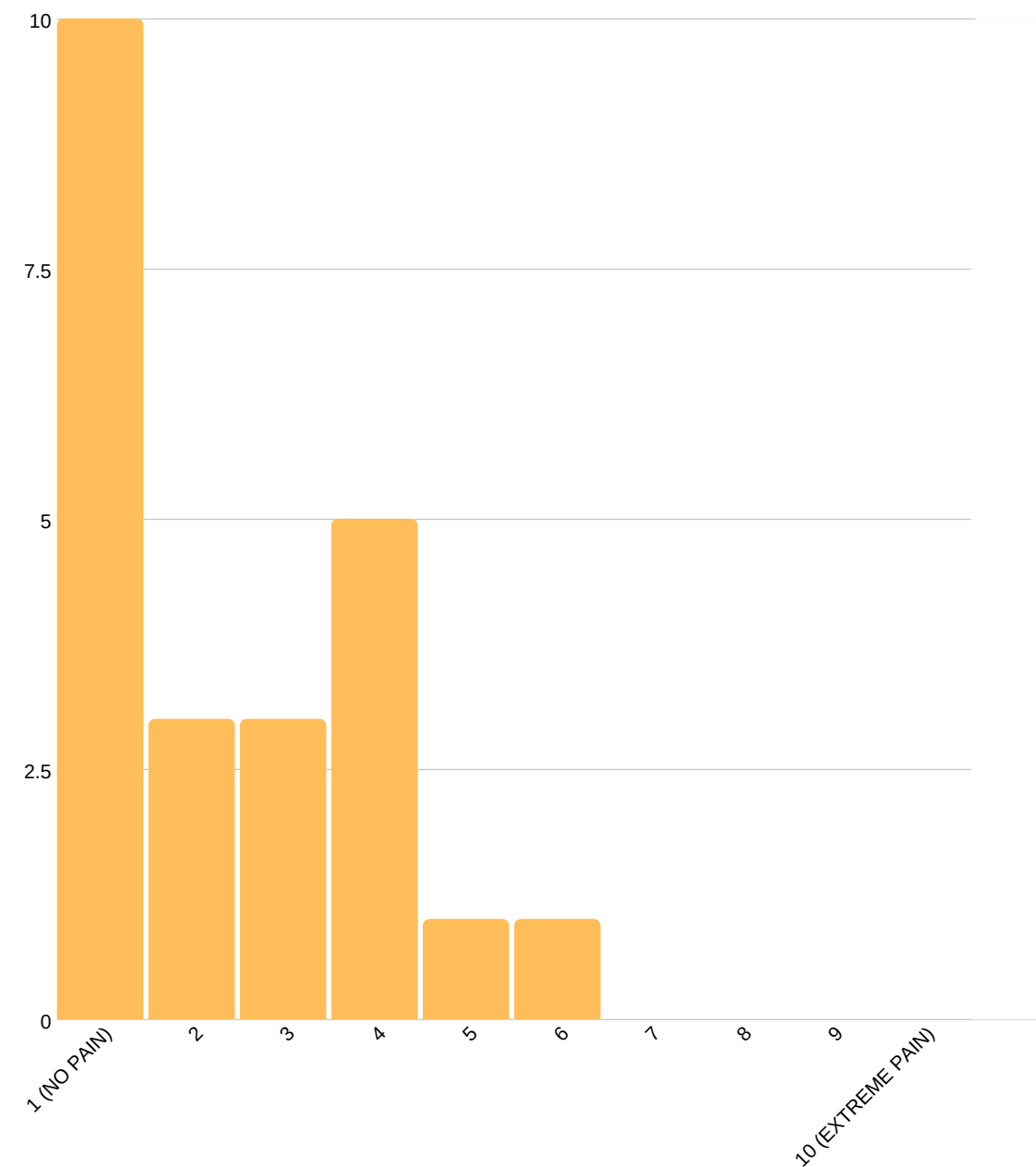
Question 2

Rate your dog's **least** pain over the past 7 days.

BEFORE treatment



AFTER 30-day treatment.



Weighted Average

BEFORE 2.71

AFTER 2.29

15.5%

IMPROVEMENT

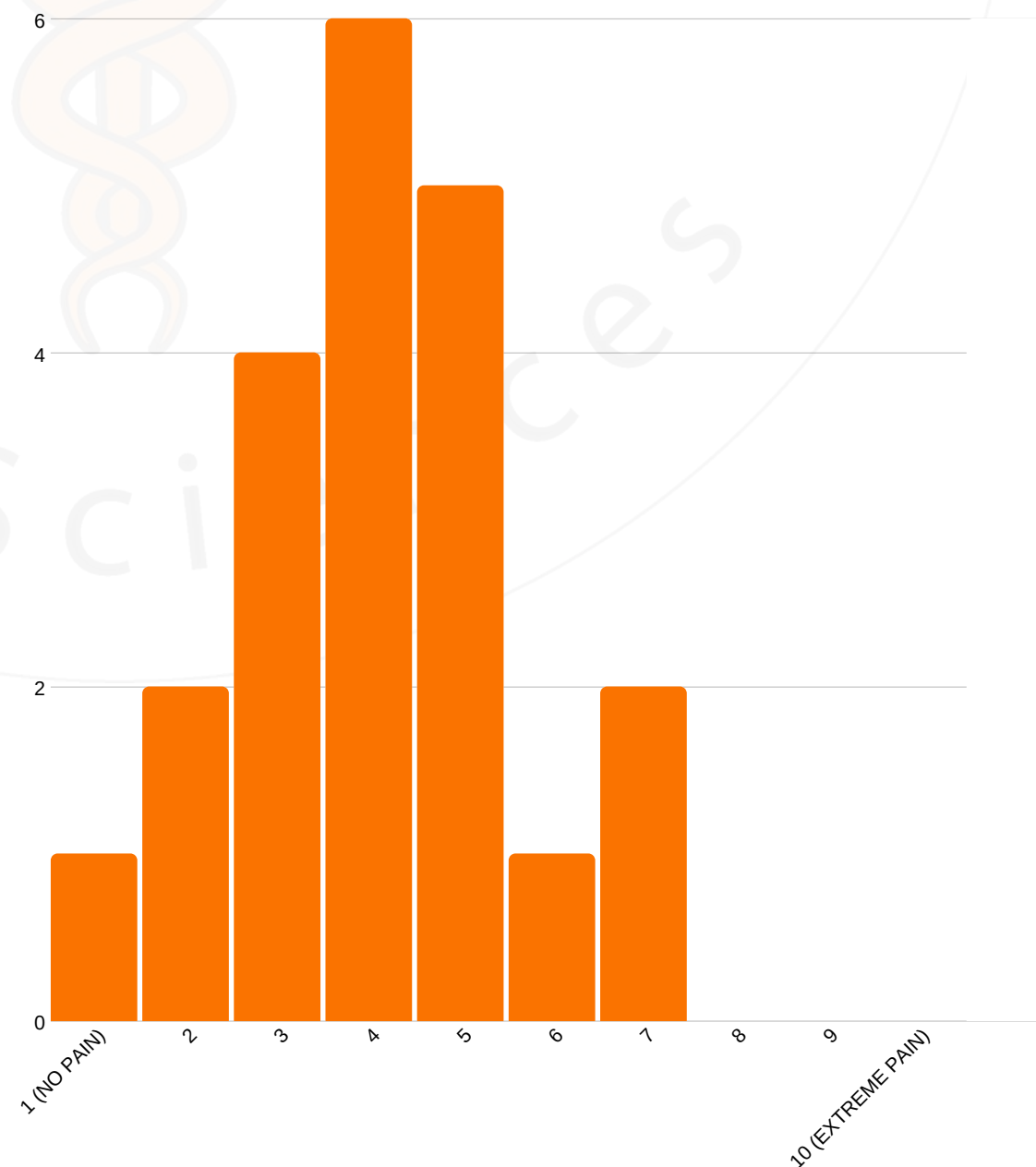
*significance .655

SURVEY SUMMARY

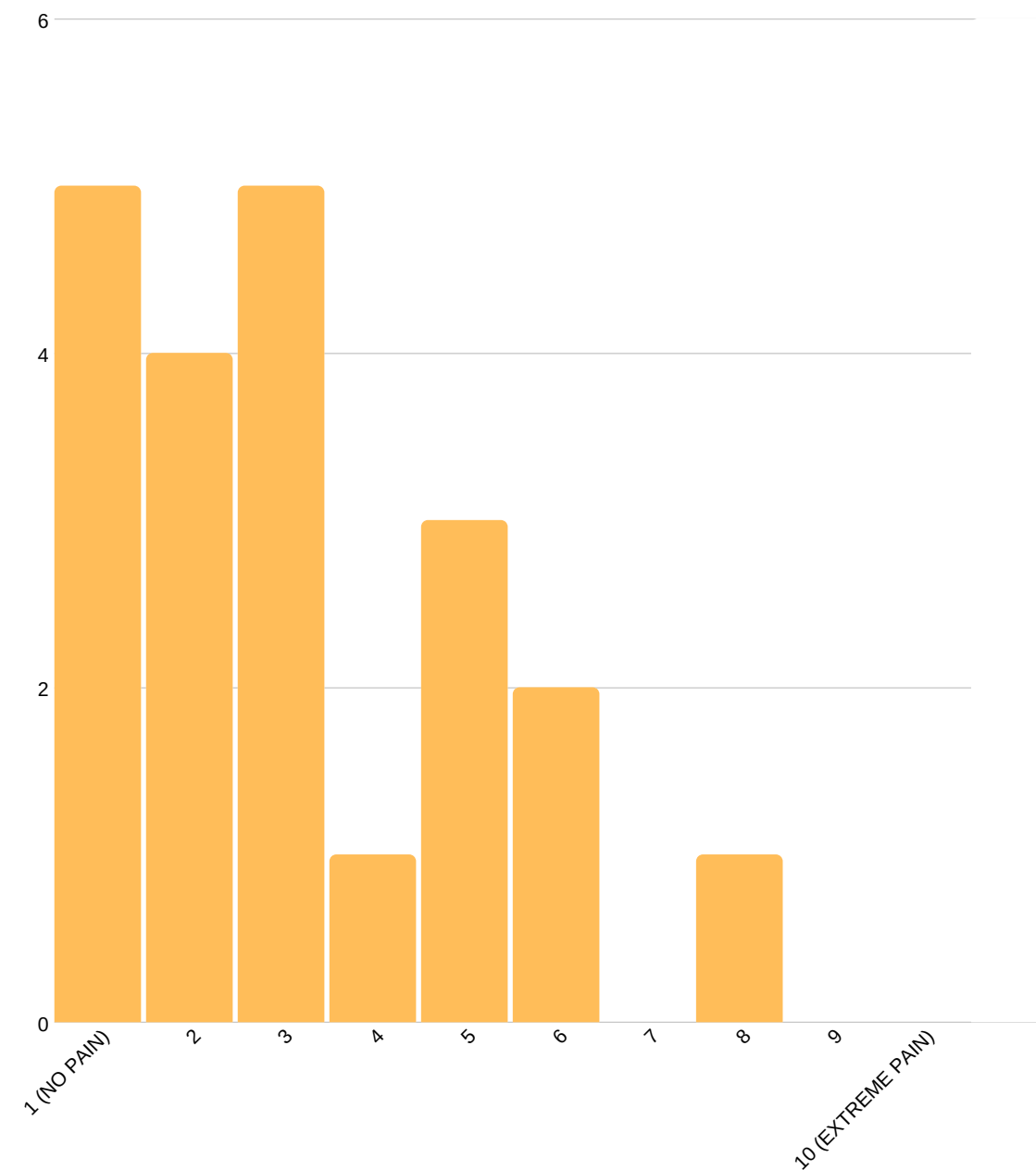
Question 3

Rate your dog's **average** pain over the past 7 days.

BEFORE treatment



AFTER 30-day treatment.



Weighted Average

BEFORE 4.10

AFTER 3.19

22.2%

IMPROVEMENT

*significance .892

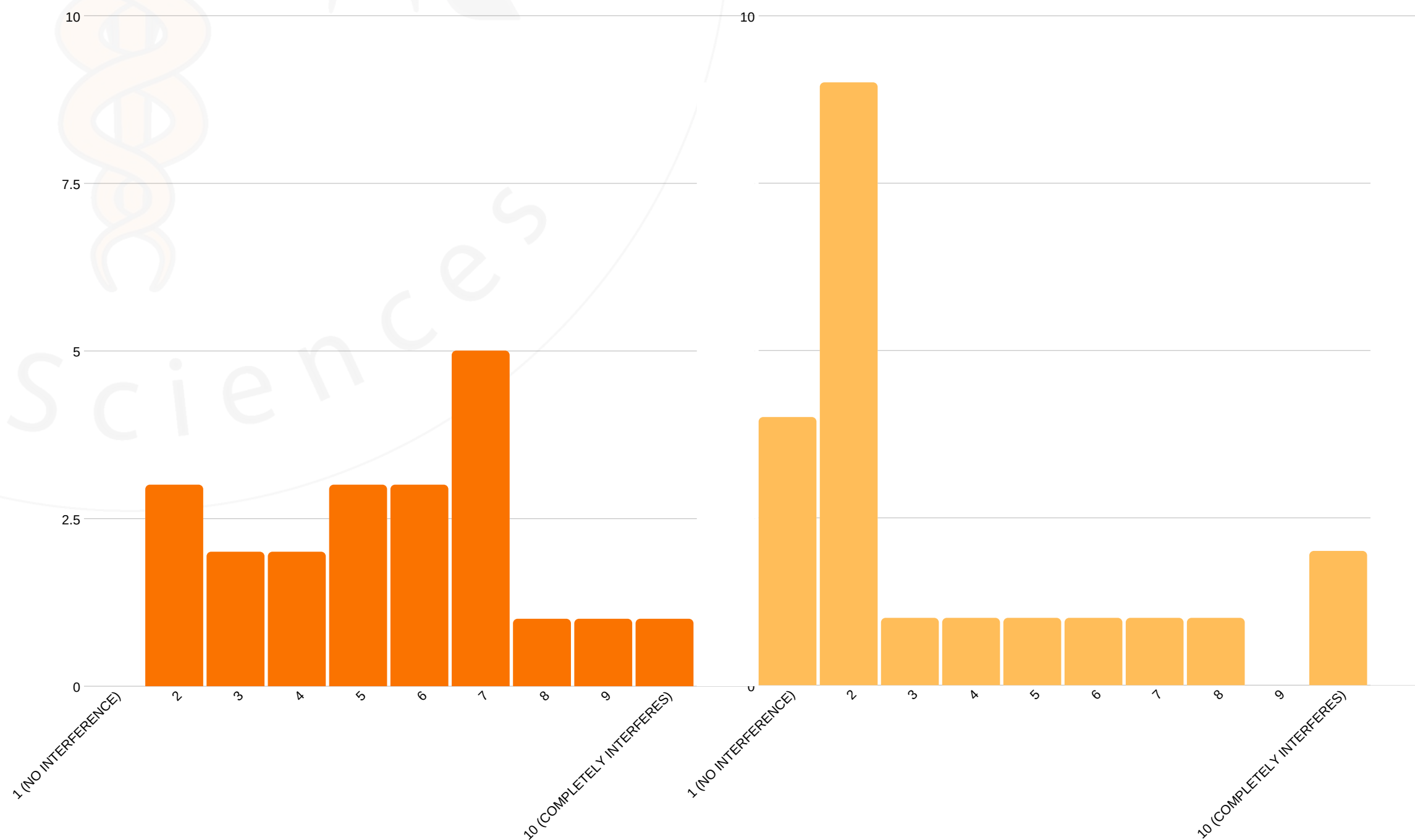
SURVEY SUMMARY

Question 4a

Rate how your dog's pain interferes with its **general activity**.

BEFORE treatment

AFTER 30-day treatment.



Weighted Average

BEFORE 5.48

AFTER 3.57

34.9%

IMPROVEMENT

*significance .976

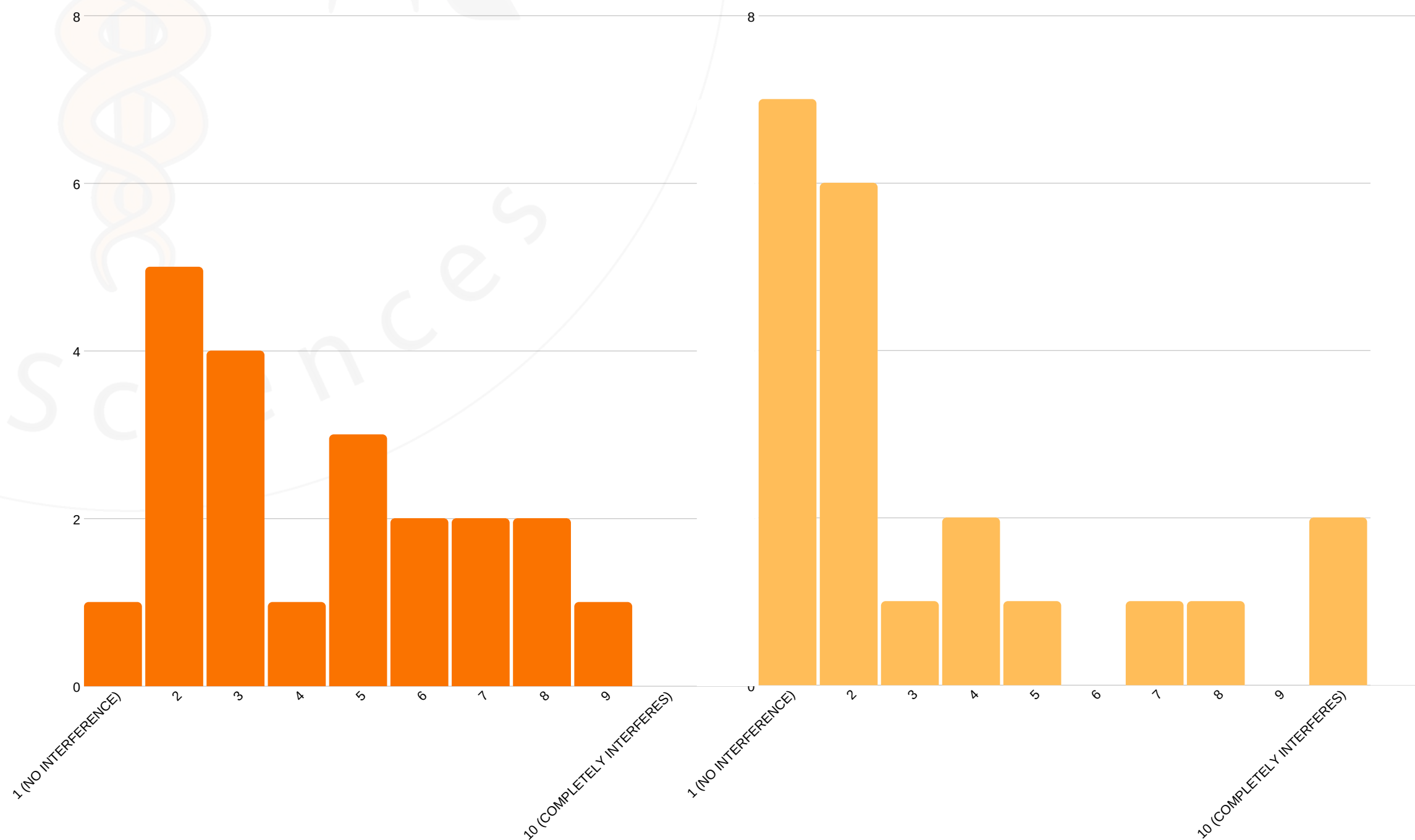
SURVEY SUMMARY

Question 4b

Rate how your dog's pain interferes with its **enjoyment of life.**

BEFORE treatment

AFTER 30-day treatment.



Weighted Average

BEFORE 4.43

AFTER 3.33

24.8%

IMPROVEMENT

*significance .804

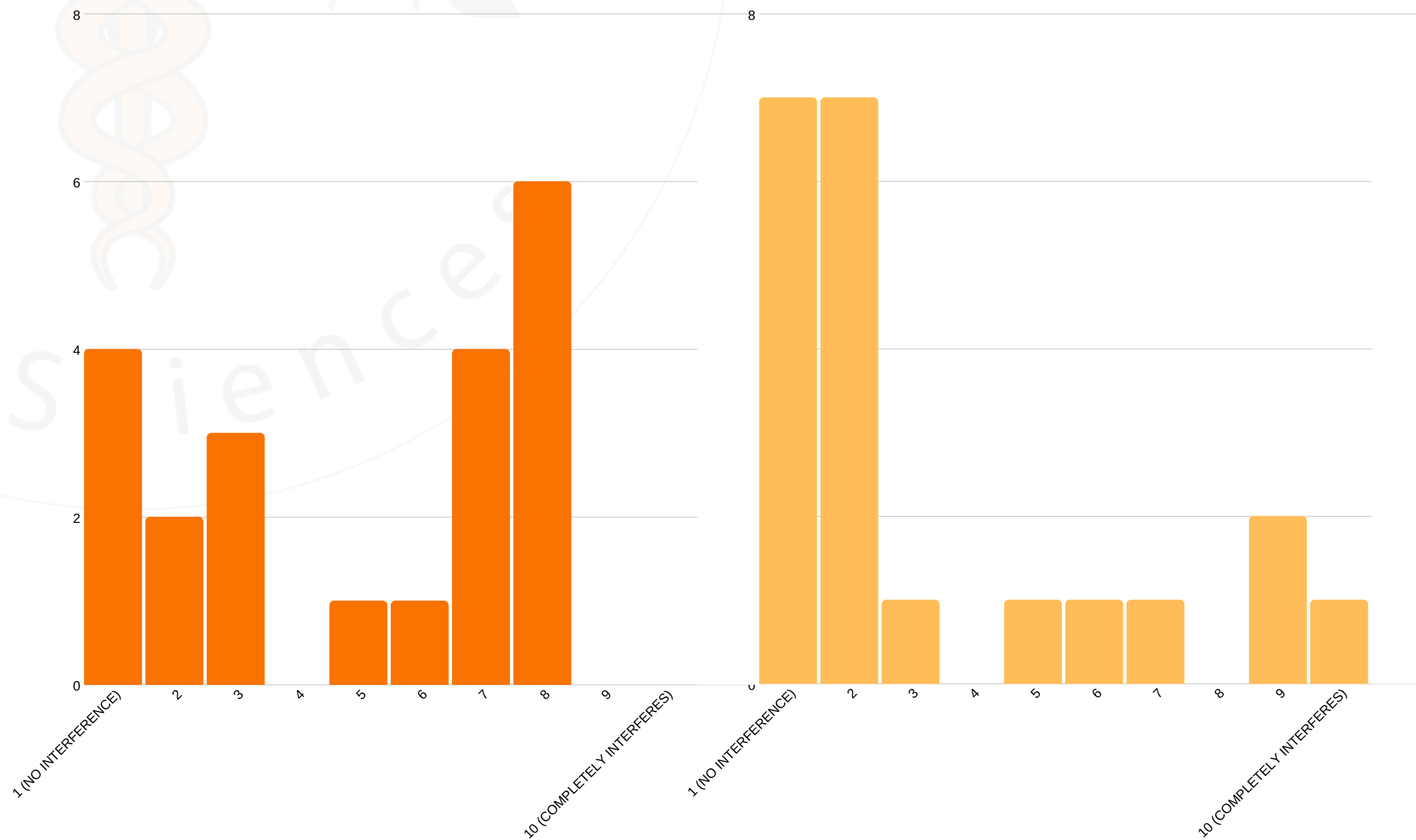
SURVEY SUMMARY

Question 4c

Rate how your dog's pain interferes with its **ability to stand after lying down.**

BEFORE treatment

AFTER 30-day treatment.



Weighted Average

BEFORE 4.95

AFTER 3.33

32.7%

IMPROVEMENT

*significance .917

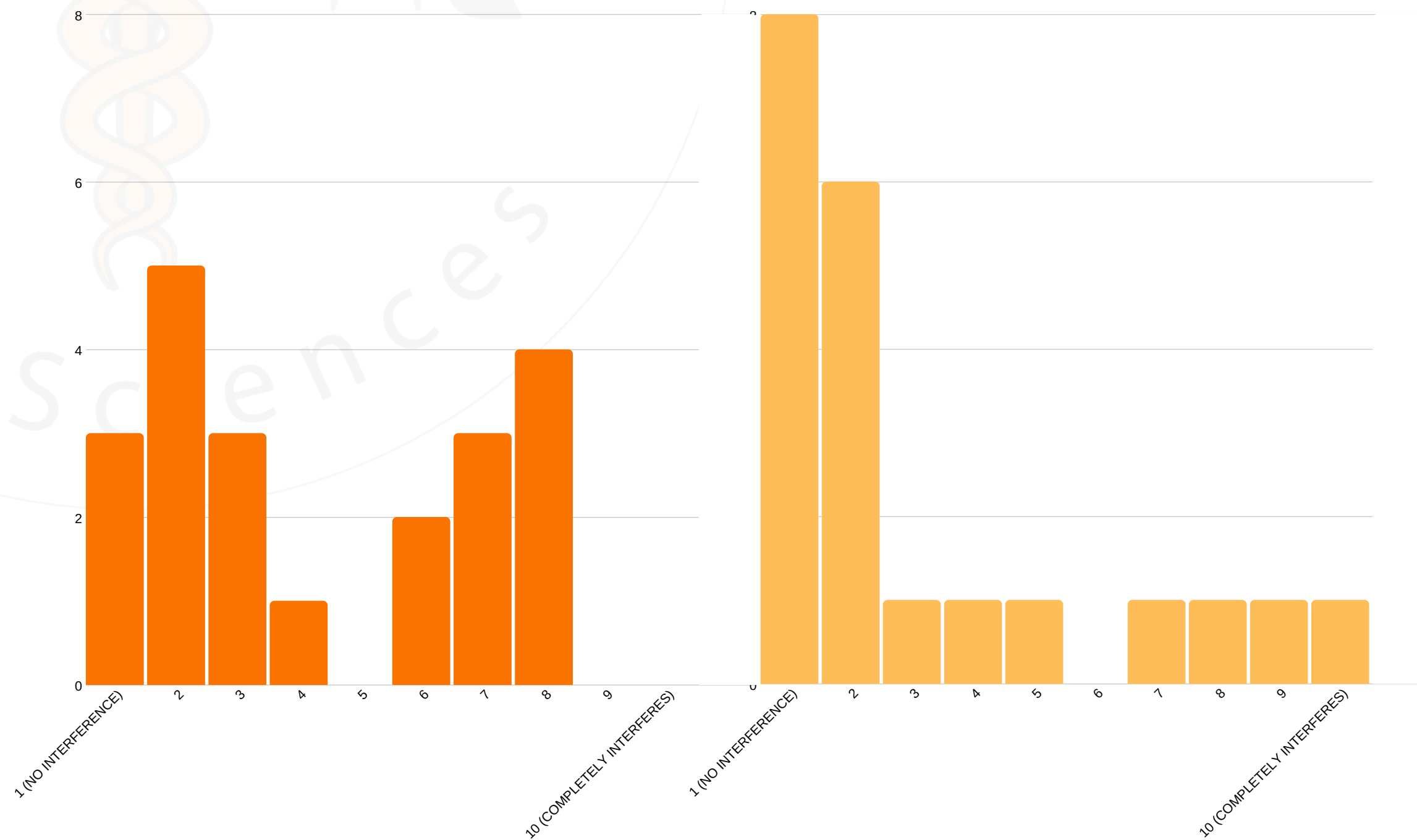
SURVEY SUMMARY

Question 4d

Rate how your dog's pain interferes with its **ability to walk.**

BEFORE treatment

AFTER 30-day treatment.



Weighted Average

BEFORE 4.33

AFTER 3.14

27.5%

IMPROVEMENT

*significance .823

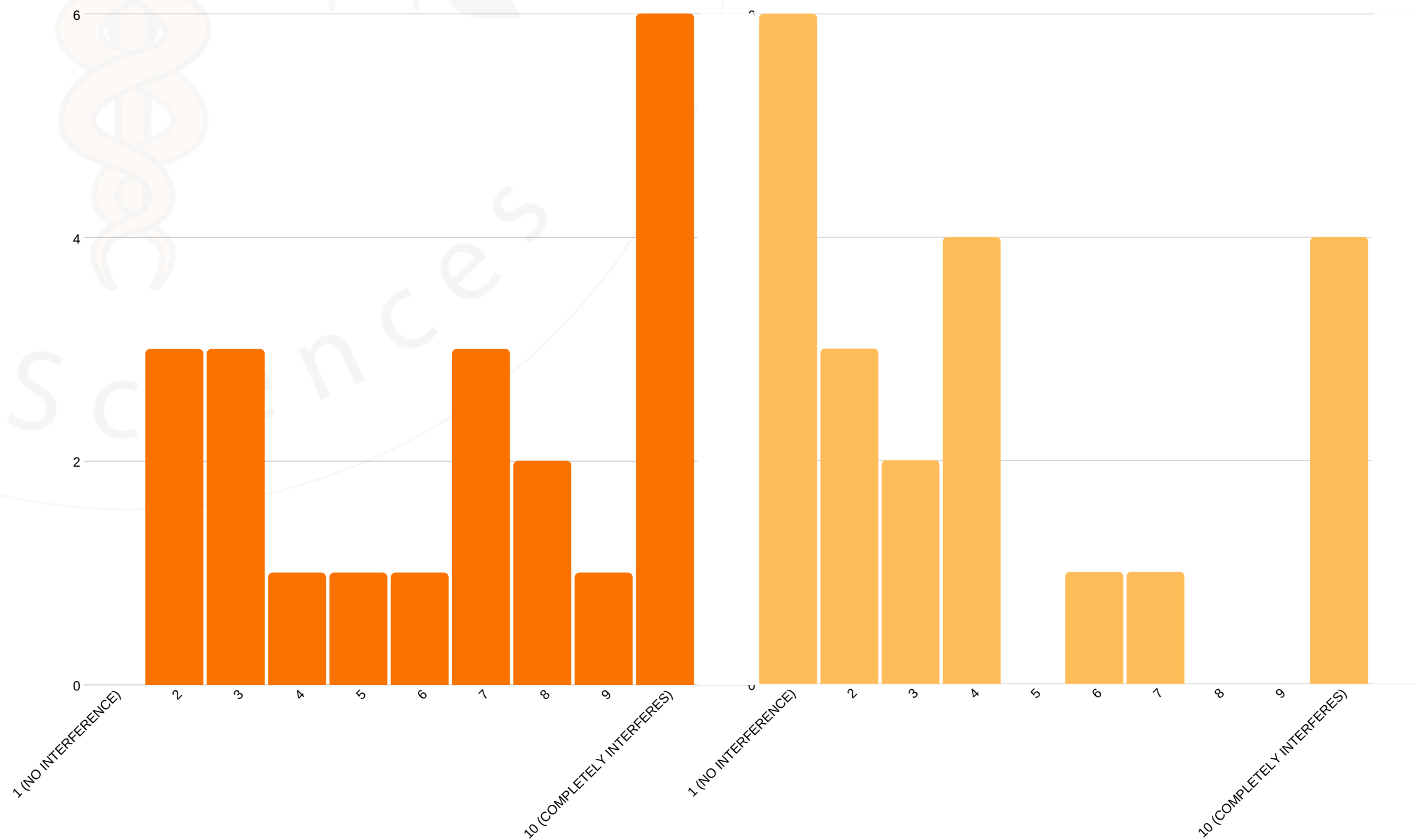
SURVEY SUMMARY

Question 4e

Rate how your dog's pain interferes with its **ability to run.**

BEFORE treatment

AFTER 30-day treatment.



Weighted Average

BEFORE 6.48

AFTER 4.14

36.1%
IMPROVEMENT

*significance .976

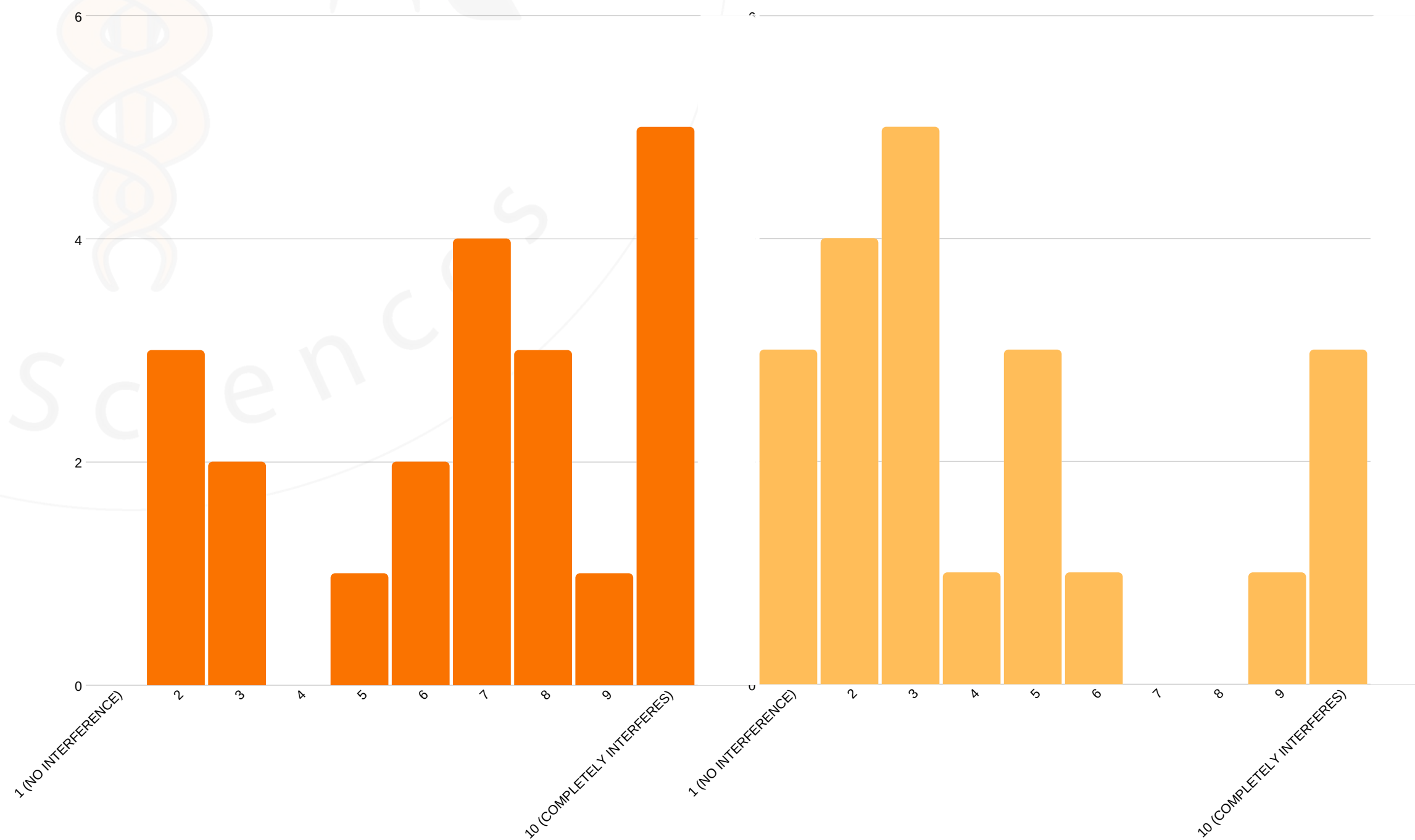
SURVEY SUMMARY

Question 4f

Rate how your dog's pain interferes with its **ability to climb stairs, curbs or get into the car.**

BEFORE treatment

AFTER 30-day treatment.



Weighted Average

BEFORE 6.67

AFTER 4.29

35.7%
IMPROVEMENT

*significance .987

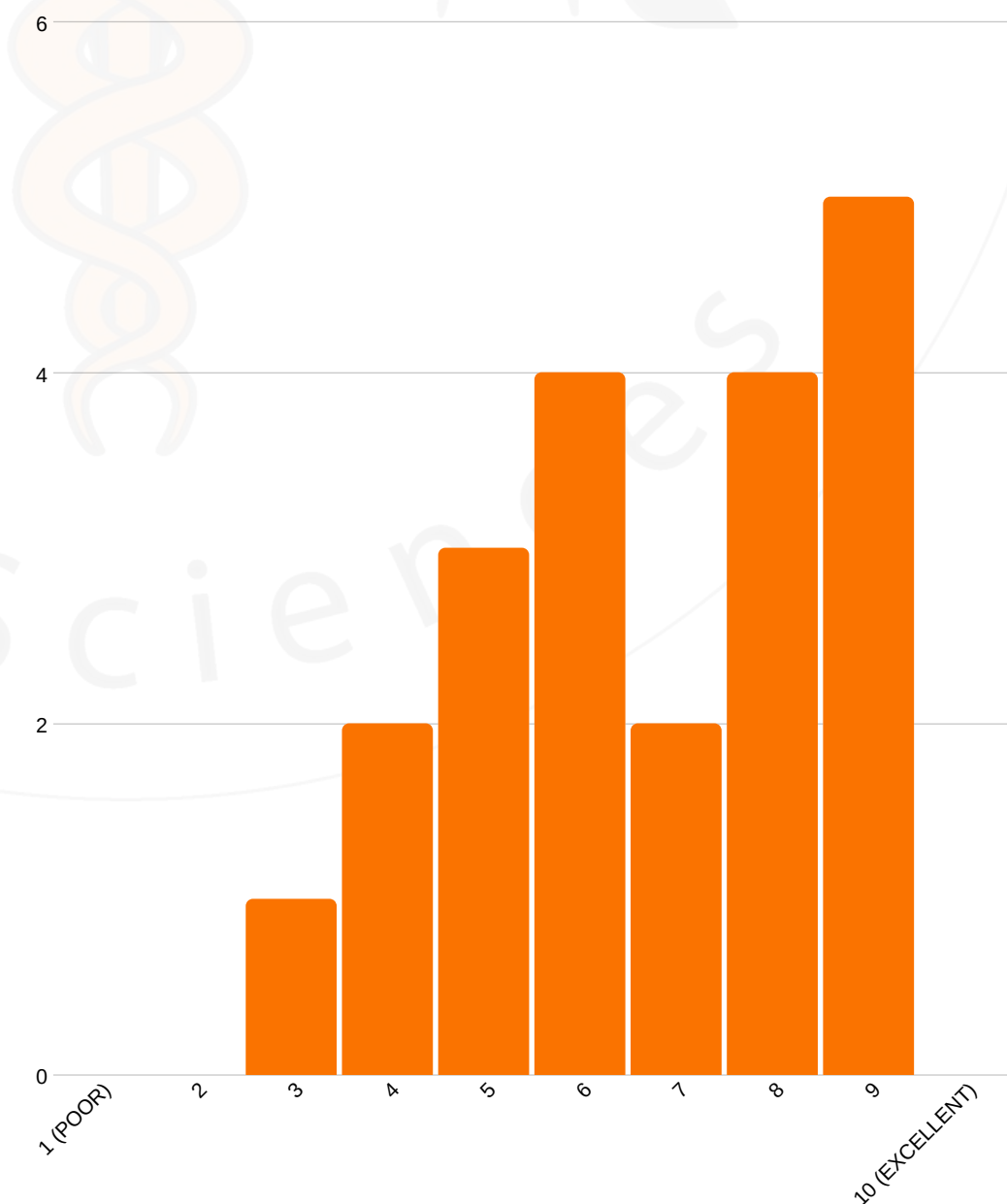
SURVEY SUMMARY

Question 4g

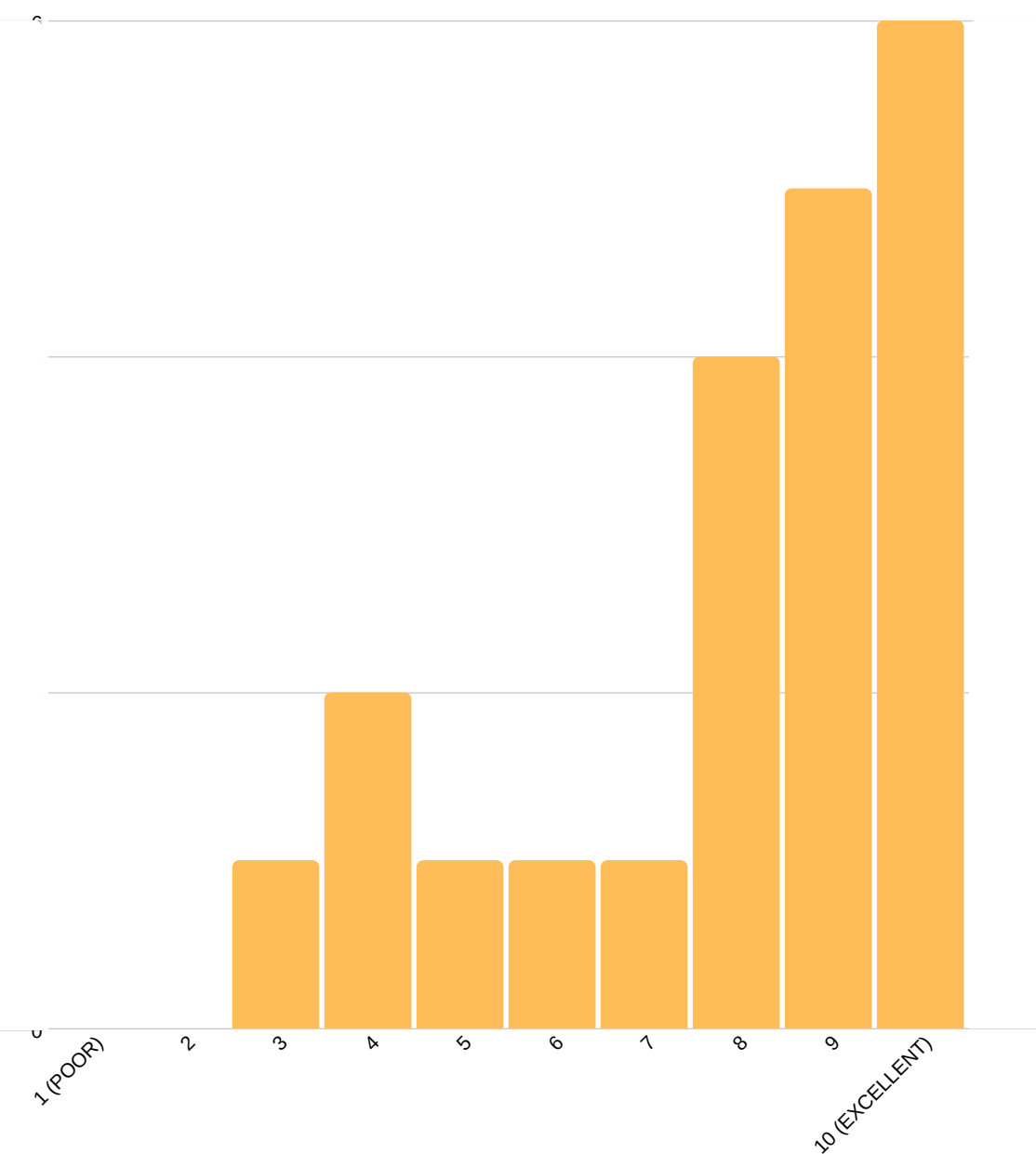
Rate how your dog's **overall quality of life**.

NOTE: the revised scale

BEFORE treatment



AFTER 30-day treatment.



Weighted Average

BEFORE 6.71

AFTER 7.90

17.7%

IMPROVEMENT

*significance .930

PRELIMINARY CONCLUSIONS

Overall, this study provided **strong evidence that a low dose of CBD does have a positive impact on the mobility and quality of an older dog's life**. As is the nature of an ongoing study, we are optimistic in our continued efforts to supplement this data with additional participants and strengthen these initial findings outlined below.

The benefits of the study provided:

- 1.** A more comprehensive understanding of how CBD and the Panacea CANINE product may be used to manage osteoarthritis; while minimizing the potential for undesirable side effects.
- 2.** Improved mobility, agility, and freedom of movement; due to pain relief provided by the Panacea product.
- 3.** An example of how CBD can be used as an adjunct to current standards of veterinary care; relating to the treatment of dogs with osteoarthritis.



NEXT STEPS

In addition to updating this current study as we gain more participants, we at Panacea plan to:

- 1. Initiate a dose escalation study with similar endpoints to further define the best dosage of CBD. (Q1 2019)**
- 2. Design an additional study to determine optimal dosing for relieving various types of anxiety in dogs.**

A photograph of a brown and white dog sitting on a person's lap, looking out at the ocean during a sunset. The sky is filled with orange and pink clouds, and the water is dark with white foam from the waves. The person's legs and black shoes are visible in the foreground.

SIDE EFFECTS

During the course of the study patients did **not** experience diarrhea, vomiting, or lethargy. The dose of CBD used in this study was well below doses used in other studies that established safe, tolerable doses of the cannabinoid.

Patients participating in the study who had been receiving other therapies may have observed differences in their pet relative to the prior therapy.

STUDY TEAM

Principal Investigator: **Dr. Joshua Sosnow**
Institution : **North Scottsdale Animal**
Organization: **Panacea Life Sciences**
Sponsor: **James W. Baumgartner, Ph.D.**

Hospital Lead Investigators:
Mitsie Vargas, D.V.M. Sean Sparkman D.V.M. Elizabeth
Boggier, D.V.M. Marina Siegart D.V.M. Jay Fulmer D.V.M.
Audra Alley D.V.M. Kamela Venable, D.V.M. Cynthia
Pope, D.V.M. Gary Edelson, D.V.M.

ADDITIONAL RESOURCES

"Pharmacokinetics of cannabidiol in dogs."

Samara E, Bialer M, Mechoulam R.

Department of Pharmacy, School of Pharmacy, Hebrew University,
Jerusalem, Israel

"Efficacy of Cannabidiol (CBD) for the Treatment of Canine Epilepsy."

Stephanie McGrath, MS, DVM, DACVIM (Neurology), at Colorado State
University's College of Veterinary Medicine

Cornell Study

Joe Wakshlag, DVM, PhD, DACVN, DACVSMR, Associate Professor and
Section Chief of Nutrition at Cornell



Thank you.

For questions or comments about this ongoing study or our products, please email us at

info@panacealife.com

WWW.PANACEALIFE.COM