A Behavioral Acclimatization Program Improves the Welfare of Heifers Enrolled In Research to Protect Human and Animal Health

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Abstract

Background: The FDA Center for Veterinary Medicine (CVM) conducts research to protect human and animal health. Animals in these studies have their welfare protected by federal laws.

Purpose: The FDA CVM uses Russell and Burch's "3 R's" to improve animal welfare. This poster describes our behavioral acclimation program for Holstein heifers, which is a refinement under the "3 R's" utilizing the process of acclimatization and voluntary actions the heifers are choosing to perform.

Methodology: All procedures were performed on the FDA CVM Institutional Animal Care and Use Committee approved protocol in an AAALAC International accredited facility. We developed a quantitative survey to track the heifers' progress in the program with scores of 1 to 4. The survey evaluates completion of desired voluntary behaviors the heifers perform, with a score of 4 meaning the action was completed without hesitation. We enrolled two cohorts of 8 Holstein heifers each to collect survey data for either 6 days or 16 days.

Results: The majority of heifers were at the peak level of performance for a majority of the observation days. The heifers did not achieve a consistent score of 4 because they were performing voluntary actions and had the option to choose not to participate. We observed that the heifers engaging in positive interactions with personnel were more amenable to perform the action for the food reward, which was offered to all heifers during every session. The behavior of the majority of the heifers was calm when personnel were interacting with them, decreasing the risk of injuries.

Conclusion: This program increases bovine welfare and personnel safety by successfully training Holstein heifers to be calm when performing desired voluntary behaviors. It was not necessary for our heifers to achieve consistent scores of 4 for our program to be successful. The survey results confirm that the heifers were performing desired behaviors at a high rate of success. The voluntary behavior of the heifers improves their welfare by the alleviation of stress and facilitates the successful completion of research projects which protect human and animal health.

Introduction

- Russell and Burch developed the concept of the "3R's" in 1959, and it has become a core tenant of animal welfare. The "3 R's" are replacement, reduction, and refinement of animal use in research. **This poster is an example of refinement.**
- Behavioral acclimatization programs use acclimatization (*the gradual adjustment of an animal to is environment*) and voluntary actions (*actions an animal chooses to perform*) with positive reinforcement to improve animal welfare by decreasing the stress of the research animals.

Materials and Methods

The heifers were trained to:
- Accept hand feeding
- Allow study personnel to touch their heads
- Voluntarily place their head through the headgate
- Stand calmly once a study personnel locked the headgate

The positive reinforcement used in our program included food, grooming, and petting of the head and neck. The heifers were socialized by personnel up to five days per week for a minimum of 30 minutes per session.

Cohorts: The heifers were divided into to cohorts of 8 each. Cohort 1 was observed for 6 days. Cohort 2 was observed for 16 days. During the daily acclimatization sessions, the heifers were scored on a scale of 1 to 4. The scores indicate the degree of completion of voluntary behaviors.

Quantitative survey scoring:
Score 1: Heifer avoids interaction with personnel, does not complete behavior.
Score 2: Heifer shows interest, hesitates to participate, does not complete behavior.
Score 3: Heifer hesitates, then completes desired behavior.
Score 4: Heifer performs desired behavior without hesitation.

Results and Discussion

The heifer in this photograph has performed desirable voluntary actions and the headgate is locked. The following photographs provide more information.

The heifer is kneeling while eating. This is a sign of a relaxed and calm heifer.

The heifer is in good body condition and has a clean and healthy hair coat.

The heifer's eyes are in a neutral position. Also a sign of a relaxed and calm heifer.

The heifer voluntarily put her head through the headgate and she was calm while it was locked.

The heifer's ears are in a neutral position. Another sign of a relaxed and calm heifer.
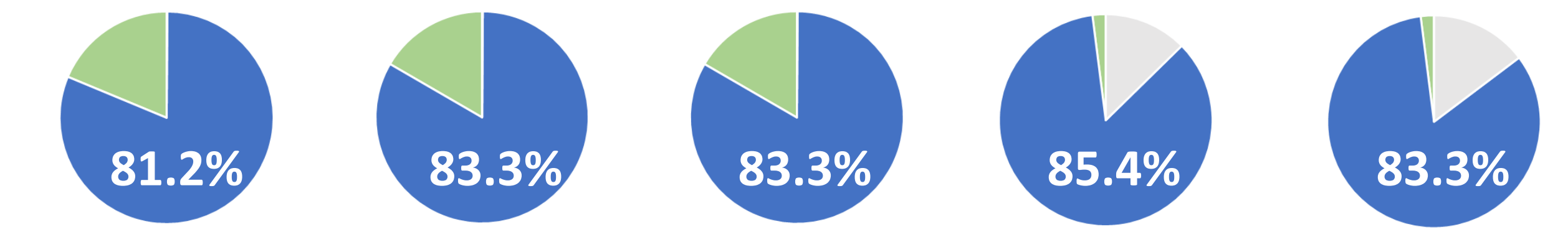
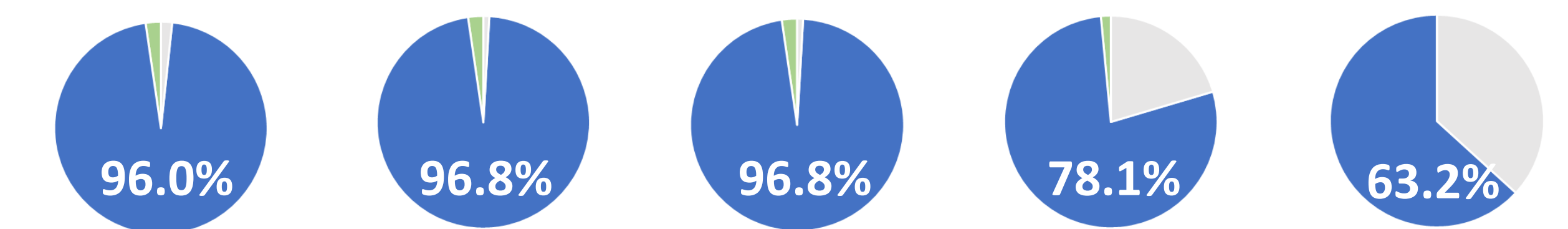The heifer is eating the food provided to her as a positive reward.

The heifer was previously acclimatized to wear a halter, which was placed while the headgate was locked. She performed the desirable voluntary actions while eating and was relaxed and calm while wearing the halter.

Survey results of cohort one, observed for 6 days

81.2%   83.3%   83.3%   85.4%   83.3%

Survey results of cohort two, observed for 16 days

96.0%   96.8%   96.8%   78.1%   63.2%

| Positive interactions with personnel | Positive or calm reactions to personnel standing by the headgate | Heifer places head through the headgate | Calm behavior when the headgate is locked | Heifer allows grooming and petting while headgate is locked |

Survey results of voluntary behaviors: The heifers in both cohorts were evaluated for completion of desirable behaviors. The blue areas represent the percentage of total survey days the heifers scored a 4 (action completed without hesitation). The green areas represent a score of 3 (action completed with hesitation). The grey areas represent uncompleted behaviors (scores of 1 and 2 combined).

- We observed that prior to this program, over 50% of the heifers would not initiate interaction with study personnel. After several months of socialization, the majority of the heifers initiated positive interaction with personnel including: licking personnel, accepting hand feeding and grooming, and voluntarily entering an open headgate. Heifers who engaged in positive interactions with personnel were more amenable to perform the desired behaviors for a food reward.
- The heifers had a consistently high success rate of performing the desired behaviors. **Most actions were performed at the peak level of 4.** The program also decreases adverse bovine behaviors, which could pose risks of injury.

Conclusion

- This program improves heifer welfare by using voluntary actions and acclimatization.
- This program trains heifers to be calm when performing desired behaviors, facilitating successful completion of research studies.
- **The heifers performed desired voluntary behaviors at a high rate of success.**

How the FDA Mission is Supported

- **This program improves the welfare of cattle enrolled in FDA studies designed to protect human and animal health.**

References: 1) Cohen, R. Development of a Snapshot Survey to Evaluate a Behavioral Acclimation Program for Laboratory Bovines. Laboratory Animal Science Professional. 2020 May.
2) *Laboratory Animal Medicine*, 3rd edition. American College of Laboratory Animal Medicine, eds. Fox, Anderson, Otto, Pritchett-Corning, Whary. Academic Press, 2015.