Using a Matrix To Facilitate The Social Housing Of Primates

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Introduction

The housing of species that live in social groups creates challenges in the laboratory environment. Under natural conditions, individuals of social species form pairs or groups based on a variety of variables, such as kinship, personality, hierarchical rank and sex. In captivity, the formation of social units is complicated as it is not possible to control the multitude of variables affecting social cohesion. In institutions where animals are allocated by protocols, infectious states and species, there is an emphasis for the selection of compatible individuals for the formation of social units.

Animal colonies with a diversity of research studies require an efficient system of categorizing and identifying individuals based on numerous parameters. A matrix can facilitate the first step in pursuing social housing by organizing individuals into a format that enables complete assessment of potential pairs. At the Centers for Disease Control and Prevention (CDC), a socialization matrix was used to manage the social housing of over 300 primates. The socialization matrix organized the entire colony based on several variables: species, subspecies, protocol and infection status. Prior to forming social units, the matrix was reviewed in order to determine appropriate pair combinations. Incompatible individuals are identified and removed to prevent the accidental grouping of animals with mismatched variables. Details regarding previous, ongoing and future socialization attempts were documented in a single location; thus, enabling the tracking of individual socialization histories. Recent recommendations for the care and use of laboratory animals place an importance on social housing. The socialization matrix facilitates the fulfillment of contemporary guidelines.

Methods

The matrix was developed using worksheets in Microsoft Excel. Individuals of a species were assigned to different research protocols; therefore, each tab of a worksheet was labeled per species and protocol number combination (e.g., mulatta 1234). In the worksheet, the identification (ID) of each animal under the protocol was displayed down a column and the same ID's were transposed across a row (Fig. 1). Location, date of birth and other variables were added in columns to the left of the ID column. A legend accompanies each matrix and defines the various tags (e.g., LH, SHIV+) used to label individuals and social units (Fig. 2).

The matrix was read by selecting an individual in the ID column and matching it with another individual from the ID's transposed in a row. The resulting cell displayed information pertaining to whether the pair was compatible based on infection status, previous social housing attempt and other variables. For each individual and combination, comment boxes were used to add descriptive details, such as disposition, current status and impending options (Fig. 3). The matrix was able to be updated as protocols, animal numbers and infection status changed.

Socialization Matrices

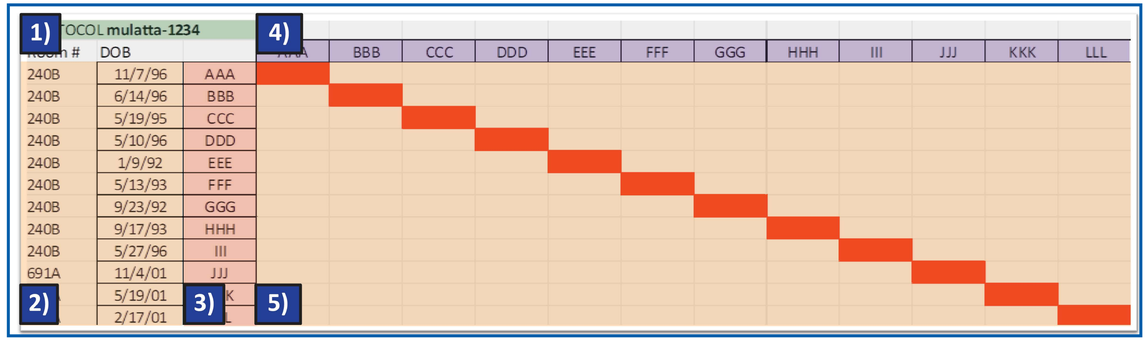

Figure 1. Configuration of a socialization matrix with 12 rhesus macaques. 1) The first cell is designated to depict the species and protocol number for the individuals; 2) independent variables (e.g., date of birth, weight, room number, etc.) associated with the individuals can be included; 3) the identification (ID) of each individual in a column; 4) the column of individual ID's transposed in a row; 5) the cells where information regarding socializations can be entered based on pair-wise matchups.

LEGEND:	SHIV+ = SHIV positive	STLV+= STLV positive	2G = double grating	X = not compatible due to study or infection
	HerpB+= Herpes B positive	SRV+= SRV positive	LH = large hole	Fail = unsuccessful partners
	SIV+= SIV positive	Euthanized	Pair = current pair	Prev = previous social partner

Figure 2. A legend describes each abbreviated annotation.

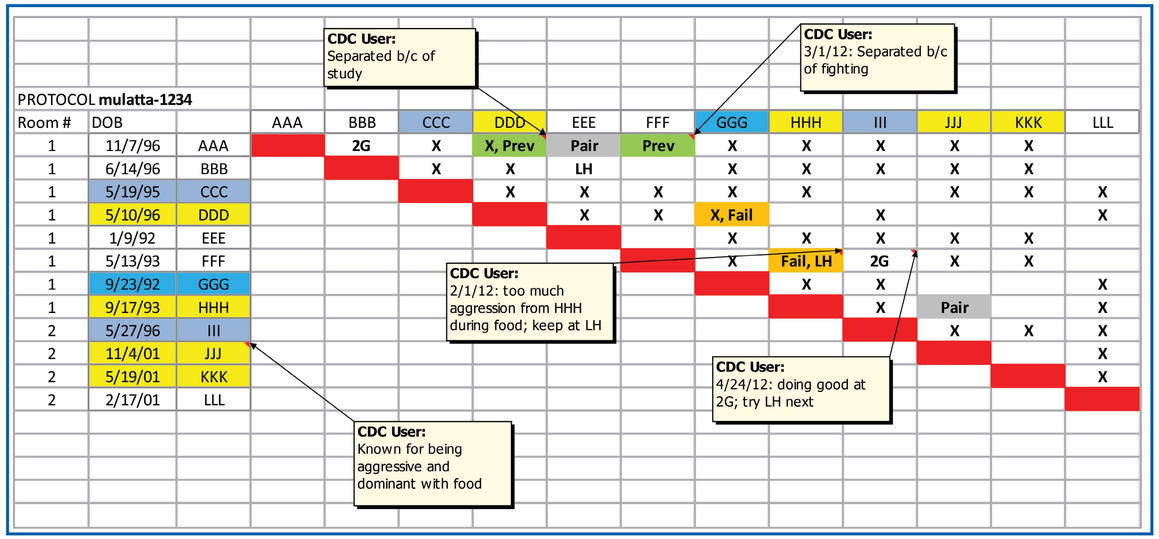

Figure 3. An example of how a socialization matrix may appear when used for social housing. Comment boxes can be added to each cell and are useful for providing details that can be used for planning, tracking and organizing pair/group formation.

Results/Applications

Prior to the use of the socialization matrix, the selection of two or more compatible individuals involved sorting through multiple files and reviewing lengthy narratives before deciding on whether two animals could be housed together. As individuals changed protocols or infection status, their compatibility with another animal would change. A solution was needed that could readily display the new options for compatibility.

In the past six months, there was an influx of over 100 new primates into the colony and these additions were distributed across several protocols. The matrix enabled efficient categorizing of the new animals based on several variables. Prospective pair combinations were determined according to social history, behavioral disposition, age, weight and protocol number. These combinations facilitated the cage setups in the rooms so that socialization attempts could be performed without delay. The matrix allowed for systematic assessment of successes and failures since each pair combination was visible on a single worksheet.

Researchers were informed about the potential socialization attempts with their animals in order to prevent the use of or separation of social units. The matrix enabled for quick and organized revisions as research protocols and infection status changed.

Conclusions

The matrix was a key feature in the procedure for the social housing of non-human primates at CDC. As a central source for information regarding which individuals are suitable for social housing, the matrix served as the beginning of our process of socialization. When presented with an influx of new animals or when research variables changed, the socialization matrix was used to identify appropriate social cohorts. The use of a matrix improved the primate social housing process at the CDC by enabling the systematic selection of compatible individuals.

Current guidelines regard social housing for social species as a standard. Forming social units in laboratories can be difficult given the diversity of variables associated with research studies. The selection of compatible individuals can be decisive to the success of pair or group formation. The socialization matrix can be applied for any species that has individuals suitable for social housing. This tool allows for an efficient system of tracking, organizing and planning combinations of compatible individuals. Social housing programs at other facilities can benefit from using a matrix to assist their efforts in the social housing of laboratory species.

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