**Supplementary Table 1. Comparison of validity and reliability and practicability respondent scores between two Delphi exercises, macaques, 56 welfare indices**.

Potential indicators reaching less than 70% agreement for practicability have been shaded grey. Areas of focus are denoted by symbols as follows:

* **Animal-focused**:behavioural#, physiological/physical##
* **Environment-focused**:micro^ (i.e. cage), macro^^ (i.e. ambient)
* **Staff-focused**:procedural and development+, husbandry++

|  |  |  |  |
| --- | --- | --- | --- |
|   | **Current study** **(n=67 respondents)**  |   | **Truelove *et al*., 2020 (n=39 respondents)**  |
| **Potential indicator**  | **Valid, Reliable (%)**  | **Practical (%)**  | **Rank based on Validity, Reliability (%)**  |   | **Composite Score (avg. Validity, Reliability, Practicability) (%)**  | **Rank based on Composite score**  | **Valid, Reliable^ (%)**  | **Practical^ (%)**  |
| Self-harm behaviour#   | 80.6  | 81.5  | 1  |   | 94.0  | 6  | 93.6  | 94.9  |
| Social enrichment^  | 77.6  | 86.5  | 2  |   | 84.6  | 28  | 85.9  | 82.1  |
| Cage dimensions^   | 76.1  | 84.3  | 3  |   | 84.6  | 29  | 85.9  | 82.1  |
| Body weight##  | 73.1  | 81.6  | 4  |   | 94.9  | 5  | 92.7  | 97.1  |
| Health monitoring programme++  | 73.1  | 79.2  | 5  |   | 97.4  | 2  | 97.1  | 100.0  |
| Appetite#    | 70.1  | 74.5  | 6  |   | 84.6  | 31  | 82.4  | 88.2  |
| Staff training++  | 70.1  | 80.9  | 7  |   | 84.6  | 30  | 79.5  | 94.9  |
| Positive reinforcement training++  | 70.1  | 76.6  | 8  |   | 84.6  | 32  | 82.4  | 82.4  |
| NHP induced injuries##  | 68.7  | 84.4  | 9  |   | 92.3  | 10  | 89.7  | 97.1  |
| Behavioural management programme++   | 68.7  | 73.9  | 10  |   | 86.3  | 24  | 83.3  | 92.3  |
| Vertical space^   | 67.2  | 91.1  | 11  |   | 93.2  | 8  | 94.1  | 94.1  |
| Cage furniture^   | 64.2  | 93.0  | 12  |   | 88.9  | 14  | 92.3  | 82.1  |
| Blood in faeces / urine##  | 64.2  | 79.1  | 13  |   | 86.3  | 25  | 88.3  | 79.4  |
| Huddled posture#    | 64.2  | 88.4  | 14  |   | 96.6  | 4  | 95.6  | 94.1  |
| Physical enrichment^   | 64.2  | 93.0  | 15  |   | 84.6  | 33  | 82.4  | 88.2  |
| Stereotypy#    | 64.2  | 72.1  | 16  |   | 88.9  | 15  | 88.5  | 89.7  |
| Social density^   | 62.7  | 76.2  | 17  |   | 96.6  | 3  | 97.1  | 94.1  |
| Food enrichment^   | 61.2  | 92.7  | 18  |   | 80.3  | 48  | 79.5  | 79.4  |
| See other NHPs^   | 61.2  | 97.6  | 19  |   | 88.9  | 16  | 84.7  | 97.4  |
| Mortality##   | 59.7  | 79.5  | 20  |   | 84.6  | 34  | 85.3  | 79.4  |
| Animal caregiver observations++   | 59.7  | 87.5  | 21  |   | 82.1  | 42  | 80.9  | 88.2  |
| Weaning age+   | 59.7  | 72.5  | 22  |   | 78.6  | 53  | 78.2  | 82.1  |
| Environmental complexity^   | 58.2  | 74.4  | 23  |   | 80.3  | 49  | 80.8  | 79.5  |
| Prolapse##   | 56.7  | 78.9  | 24  |   | 91.5  | 12  | 92.7  | 91.2  |
| Frequency of surgeries during lifetime+  | 55.2  | 70.3  | 25  |   | 85.5  | 27  | 86.8  | 79.4  |
| Humane euthanasia programme++   | 53.7  | 86.1  | 26  |   | 98.3  | 1  | 97.1  | 100.0  |
| Frequency of sedations during lifetime+   | 53.7  | 72.2  | 27  |   | 73.5  | 55  | 83.9  | 73.5  |
| Frequency of medical procedures during lifetime+   | 53.7  | 72.2  | 28  |   | 81.2  | 45  | 89.7  | 84.6  |
| Visual barriers between cages^   | 50.7  | 91.2  | 29  |   | 88.0  | 21  | 88.3  | 88.2  |
| Frequency of moves during lifetime+   | 49.3  | 66.7  | 30  |   | 79.5  | 50  | 87.2  | 87.2  |
| Visual barriers within cages^   | 47.8  | 90.6  | 31  |   | 79.5  | 51  | 86.8  | 61.8  |
| Discharges##   | 47.8  | 90.3  | 32  |   | 84.6  | 35  | 85.3  | 82.4  |
| Environmental-induced injuries##   | 46.3  | 61.3  | 33  |   | 83.8  | 37  | 84.6  | 82.1  |
| Rearing history+   | 46.3  | 71.0  | 34  |   | 86.3  | 26  | 92.7  | 76.5  |
| Provision of variety of food^   | 44.8  | 83.3  | 35  |   | 88.9  | 17  | 83.9  | 97.1  |
| Room temperature^ ^   | 41.8  | 71.4  | 36  |   | 92.3  | 11  | 94.2  | 88.2  |
| Field of view^   | 41.8  | 55.6  | 37  |   | 81.2  | 46  | 83.9  | 76.5  |
| Dyspnoea#    | 38.8  | 73.1  | 38  |   | 88.9  | 18  | 83.8  | 94.1  |
| Sensory enrichment^  | 38.8  | 73.1  | 39  |   | 91.5  | 13  | 91.2  | 94.1  |
| Fear of other NHPs#    | 37.3  | 56.0  | 40  |   | 83.8  | 38  | 92.3  | 89.7  |
| Disease surveillance++  | 35.8  | 87.5  | 41  |   | 83.8  | 39  | 79.4  | 85.3  |
| Destructible enrichment^  | 35.8  | 91.7  | 42  |   | 84.6  | 36  | 83.9  | 88.2  |
| Frequency of chair restraint+   | 34.3  | 52.2  | 43  |   | 88.0  | 22  | 88.2  | 91.2  |
| Light intensity^ ^  | 32.8  | 95.5  | 44  |   | 92.3  | 9  | 89.7  | 97.1  |
| Hear other NHPs^ ^   | 32.8  | 86.4  | 45  |   | 82.9  | 40  | 82.4  | 91.2  |
| Cage position^  | 32.8  | 57.1  | 46  |   | 82.1  | 43  | 85.3  | 76.5  |
| Room cleaning frequency++   | 32.8  | 68.2  | 47  |   | 79.5  | 52  | 83.8  | 73.5  |
| Manipulanda^   | 31.3  | 71.4  | 48  |    | 88.0  | 23  | 86.8  | 97.1  |
| Humidity^ ^   | 29.9  | 78.9  | 49  |   | 88.9  | 19  | 85.3  | 97.1  |
| Room ventilation^^  | 26.9  | 77.8  | 50  |   | 94.0  | 7  | 94.1  | 94.1  |
| Daily number of meals++   | 26.9  | 77.8  | 51  |   | 81.2  | 47  | 78.0  | 97.1  |
| Intentional exposure to novelty++   | 26.9  | 50.0  | 52  |   | 71.8  | 56  | 80.9  | 76.5  |
| See humans^  | 25.4  | 88.2  | 53  |   | 88.9  | 20  | 86.8  | 91.2  |
| Daily timing of meals++  | 22.4  | 80.0  | 54  |   | 76.1  | 54  | 80.9  | 79.4  |
| Frequency of inoculations during lifetime+   | 17.9  | 75.0  | 55  |   | 82.1  | 44  | 80.9  | 88.2  |
| Provision of browse^  | 17.9  | 83.3  | 56  |   | 82.9  | 41  | 82.4  | 88.2  |

^Individual scores extracted from reported composite score, for comparison.